

Taking Stock

Adding Sustainability Variables to Asian Sectoral Analysis

February 2006

Auto
Banking
Metals & Mining
Oil, Gas & Petrochemicals
Power
Pulp, Paper & Timber
Supply Chain
Technology

Metals & Mining

Researcher: Nancy Frohman
Editor: Melissa Brown

Association for Sustainable & Responsible Investment in Asia



CONTENTS

INTRODUCTION.....	3
COUNTRY AND SECTOR DYNAMICS.....	4
What the sector looks like today.....	4
Cross-cutting issues.....	7
Long-term sector outlook.....	10
OPERATING CHALLENGES: RAISING ENVIRONMENTAL, HEALTH AND SAFETY STANDARD.....	12
Health, Safety and Labor Supply — Key Issues for China.....	14
Ok Tedi Copper Mine: Corporate Lessons and Business Losses.....	16
PROJECT REALITIES: ASSESSING NECESSARY COMMUNITY AND INFRASTRUCTURE INVESTMENTS.....	18
ASIAN STEEL, ALUMINUM, AND CEMENT: WATCH THE ENERGY APPETITE.....	23
THE LONGER TERM: HIGHER RISK, GLOBALIZATION, AND NEW TRANSPARENCY INITIATIVES.....	25
INVESTOR QUESTIONS FOR COMPANIES.....	29
APPENDIX.....	32
RESOURCES.....	33

Sustainability

Sustainability is a systemic concept, relating to the continuity of economic, social, institutional and environmental aspects of development. In the terms of the 1987 Brundtland Report of the UN's World Commission on Environment and Development, sustainability is: "Meeting the needs of the present generation without compromising the ability of future generations to meet their needs." The key concept for investors is the need to address a range of environmental, social, and governance (ESG) factors which will inevitably shape long-term returns as markets respond to changing resource requirements and public priorities.

INTRODUCTION

Asian metals, mining, and building materials companies have a uniquely high sustainability risk profile. The extractive, metals processing, and cement industries have high environmental impacts with an equally complex array of related social and governance impacts. While legal and regulatory remedies have been brought to bear on developed market players, there remain complex challenges for investors attempting to analyze the risks associated with operations in developing countries, with fewer formal mechanisms for regulation and dispute resolution.

This is a highly diverse sector, covering a range of industries and corporate practices. On one end of the spectrum are publicly listed Asian steel producers, global leaders in their industry who have embraced sustainability issues as a means to reduce operating risk and differentiate themselves from the second tier operators. The steel industry as a whole has embraced the benefits that energy-saving and good community relations bring to its business for the long term. The larger Asian companies in this sector set protocol on a variety of industry standards based on their size and growing scope as they become the front-runners in global business expansion. Beyond the first level of world-class companies, the smaller Asian operators in this sector have much work to do — a reality that will have a direct effect on both their short-term profitability and long-term viability.

The steel industry as a whole has embraced the benefits that energy-saving and good community relations bring to its business for the long term

On the other end of the spectrum are the Asian extractive mining companies which are just beginning to attract attention in global equity markets, and have much to do to better manage sustainability risks and their long-term growth prospects. The universe of listed Asian mining companies is dominated by government-owned entities, smaller privately owned companies often with a combination of foreign and government or government-linked shareholders, and subsidiaries of global multinationals. Still heavily government influenced, Asian mining companies typically base their sustainability policies on little more than regulatory compliance. By contrast, foreign companies operating in Asia have often paid a high price for relying on policies strictly based on compliance with a regulatory framework that is murky and inconsistently administered. Scarred by these incidents, many global multinationals active in the region have improved transparency and practices to go beyond regulations that are just beginning to be addressed, if at all, by the Asian players.

Asian extractive mining companies are just beginning to attract attention in global equity markets

This wide variance of approach, level of focus, and disclosure on sustainability issues creates numerous challenges for investors. Although sustainability risks and their effect on operating results are beginning to be discussed within the traditional analysis of the sector, it is still very much secondary to discussions of supply and demand, life cycle and commodity pricing. However, in these energy-intensive, highly intrusive, yet lucrative industries, tied so closely to both government-owned businesses and economic development, issues of sustainability can have vast influence over a company's profitability and equity value. We look at four issues, which we feel warrant attention by investors in order to fully understand the risk profile and value of an investment in the metals and mining industry. These issues are explored against the backdrop of four key subsectors: metals mining, coal mining, metal processing (aluminum and steel) and cement.

The sub-sectors have some similarities as well as differences which will be highlighted. In this report, we assess these issues in the context of Asia's most broadly held large and mid-capitalization listed metals, mining, and building materials companies. We believe that the most important sustainability themes for investors in these companies will be:

- **Rising EHS standards** Rising regulatory standards will result in higher costs as companies invest to meet tougher safety, environmental, and health standards
- **Community investment** Successful projects often require investment in community-linked infrastructure if long-term returns are to be realized
- **The energy appetite** High energy needs make these industries vulnerable to changing energy policies
- **Globalization and accountability** Longer term, management of higher risk projects, accelerating globalisation, and new transparency initiatives will reinforce the materiality of sustainability variables

COUNTRY AND SECTOR DYNAMICS

What the sector looks like today

Asia plays a central role in the metal, mining and cement industry, both as a supplier of raw and finished materials and increasingly as a driver of demand

Asia plays a central role in the metal, mining and cement industry, both as a supplier of raw and finished materials and increasingly as a driver of demand as global commodity markets respond to the needs of Asia's growing processing industries. A significant portion of the world's natural resource reserves is based in the Asian region. One would expect that exploration in the region could well produce higher reserves. Reserve prospects in many countries in Southeast Asia are still quite good, with indications of undeveloped reserves in Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand and Vietnam. China ranks second in world coal production, according to the International Council on Metals and Mining (ICMM).

Figure 1 Selected Mineral Reserves in Asia

Mineral	Reserves (% in Asia)
Bauxite and Aluminum	17%
Copper	10%
Iron Ore	19%
Lead	14%
Nickel	16%
Zinc	17%

Source: MMSD 2002 and ICMM 2005

Asia is also a large and growing consumer of metals and minerals as the global supply chain shifts from developed industrial countries to Asia. According to the Mining, Minerals and Sustainable Development (MMSD) 2002 report, Asia consumes more than a third of most of the world's metals and minerals including aluminum (35%), lead (30%), zinc (40%), copper (39%), nickel (40%), gold (61%), and coal (36%). These figures are increasing as the region, particularly China and India, develops. China alone took the position of largest consumer of coal and iron ore in 2003, according to ICMM at 26% and 31% of global consumption.

Figures for steel production and consumption mirror that of the minerals sector. Asia is a major producer and consumer of steel and steel products.

Figure 2 Global Crude Steel Production (million metric tonnes)

China	220.1
European Union	183.8
Japan	110.5
United States	90.4
Russia	62.7
South Korea	46.3
Ukraine	36.9
India	31.8
Brazil	31.1
Taiwan	18.8

Source: International Iron & Steel Institute (worldsteel.org) Sustainability Report 2004

China has pushed world steel production up by one third over the last five years, producing 27% of the world's steel. While China's exports of steel have been rising in 2005, a large proportion of the steel produced is still used domestically. While there has been much speculation concerning the durability of the current steel cycle, over the near term, secular growth in China's demand for resources seems well established in line with broader economic and industrial trends such as the growth of the auto and white goods sectors. India also plays a major role in steel production and consumption. Industry experts expect India's role in this market to continue to increase. India's consumption of finished steel rose from 14.8 million tonnes in 1991-92 to an estimated 34 million tonnes in 2004-05.

The listed Asian metals, mining and cement sector is dominated by companies in North Asia — China, Korea, and Taiwan — as well as those in India. Most of the larger listed companies operate in the production side of the business — steel, aluminum and cement — and hold quite prominent positions as global players in their industries. These companies are paving the way as the new Asian corporate giants, expanding into foreign markets and, in some instances, setting the standard for Asian business practices in the areas of sustainability.

The listed Asian metals, mining and cement sector is dominated by companies in North Asia — China, Korea, and Taiwan — as well as those in India

Coal and certain other extractive industry players are up and coming as the new larger public companies, particularly again in China and India. Many of these companies are the result of government privatizations, particularly in China where the government is focused on consolidating its coal industry. The

Chinese government has identified five key players to be the main coal producers in the country, allowing these players to sell minority stakes to bring in new capital and technology, and using bankruptcy as a mechanism for consolidating smaller, less efficient operations. The new publicly listed companies in the sector are increasingly being required to meet international expectations on governance, controls, disclosure, and accountability in order to attract overseas investors.

While the extractive mining industry is very active in other parts of Asia, particularly in resource-rich countries such as Indonesia and Papua New Guinea, companies in this region are predominately privately owned joint ventures between a local owner and a foreign partner with a global footprint. Those companies that are public have smaller market capitalizations and are less actively traded. However, many of the risk factors which apply to the larger publicly listed companies also apply to these companies and will be discussed as appropriate.

Figure 3 Larger Regional Listed Metals & Mining Companies

Industry Segment	Market	Company	Market Cap* (US\$mm)
Iron and steel	China	China Shenhua Energy	19,949
		Baoshan Iron and Steel	8,947
		Maanshan Iron and Steel	2,135
		Angang New Steel	1,492
		Chongqing Iron and Steel	266
	India	Tata Steel	4,673
		Jindal Vijayanager	657
		Essar Steel	277
	Korea	Posco	17,591
		INI Steel	1,912
		Dongkuk Steel	1,151
	Taiwan	China Steel	8,025
		Tung Ho	441
Yieh Phui		436	
Sheng Yu		236	
Nonferrous metals and coal	China	Yanzhou Coal	3,432
		Zijin Mining Group	2,322
		Aluminium Co of China	1,984
		Jiangxi Copper	1,607
	India	Hindalco	21,450
		Aditya Birla Group	9,000
		Vedanta Resources	4,298
		Nalco	3,106
	Indonesia	Bumi Resources	1,501
	Thailand	BANPU	870

* As at 30 December 2005, or last official day of trading

Source: Bloomberg, December 2005

Foreign-owned entities in the region operate under a range of corporate structures. As mentioned, in Southeast Asia, the foreign mining company is typically a joint venture partner with a local entity, operating a single production company or mine. Key examples are PT Freeport and Indaro Coal in Indonesia, among others. Placer Dome, Rio Tinto, and BHP Billiton are also active in the region through directly owned subsidiaries. Foreign owners could be a major or a junior mining company, such as Sino Gold or others structured as a foreign owned joint venture with assets only in Asia. Another avenue for foreign participation in Asian metals and mining companies exists via equity investments in publicly listed entities. Recent examples include Anglo American's US\$150million investment in China Shenhua Energy.

Foreign owned entities play a critical role in shaping the competitive landscape and frequently set the standard on sustainability practices

While this report focuses on the publicly listed, Asian-operated companies in the region, foreign owned entities play a critical role in shaping the competitive landscape and frequently set the standard on sustainability practices. These companies are providing funding and investment opportunities, of course, but also, with their more complete disclosure and media focus, offer insights into both best and worst practices in the industry. This is particularly so in the extractive side of the sector where disclosure is at a minimum and the impact of sustainability risks is still relatively hidden by local operators. Intense pressure from stakeholders based on poor performance in the past has been successful in getting the issues onto the table of most global companies within the industry. There are still questions as to whether these companies are fully addressing the issues, particularly in the extractive industries. However, global sector leaders have, to varying degrees, embraced sustainability policies which now provide not only a framework by which to compare local entities but also to assess the investment impact of sustainability management practices.

Cross-cutting issues

To assess the investment impact of sustainability risks associated with the metals and mining industry, it is important to identify cross-cutting sustainability themes which shape the industry. Due to the diversity of the sector, we find more cross-cutting risks for the metals, mining, and building materials industries than are common to other more uniformly configured sectors. Key issues are:

- **Commodity pricing**
- **Inconsistent disclosure**
- **Government involvement**

Commodity pricing The key revenue driver for the sector is the undeniable influence of global markets on commodity and product price. In the extractive industry, global commodity pricing is often the dominant factor controlling revenue, typically without the benefit of adjustment for company or country-specific energy or operating cost variables. For the production side of the industry, such as steel, the key driver is supply and demand for the finished product, with neither energy costs nor raw material costs a direct pass-through. As both a key supplier and consumer of product, Asia, particularly China and India, exerts significant influence on the global marketplace.

Companies in the region often rely on government subsidies in the form of preferential energy and other tariffs to keep profit margins in line

Thus, Asia plays a crucial role in the global supply and demand picture for metals and mining products. However, companies within the industry have little control over the price of their product, with the ability to improve profitability limited to cost management or production expansion, rather than pricing mechanisms. At the same time, companies in the region often rely on government subsidies in the form of preferential energy and other tariffs to keep profit margins in line. In addition, domestic demand for strategically important commodities is often shaped by import tariffs or restrictive quotas to protect local companies.

The result has often been pressure on expenses related to health, safety and the environment. New technologies and energy sources that reduce costs are an opportunity and benefit to companies in managing their cost structure. How issues of sustainability associated with these issues play out in Asia is an important element in determining which players will be able to preserve operating margins in a sector which searches to control costs as a counterweight to cyclical commodity pricing swings.

Inconsistent disclosure Inconsistent disclosure and limited comparable statistical data are distinct impediments to complete analysis of the diverse sustainability risks of metals and mining companies in Asia. While some companies are notable for their disclosures, there is little consistency in reporting, even in terms of more traditional items such as accounting standards, reserve valuations and governance implementation. As a result, it is not possible to substantiate key aspects of corporate performance without relying on a patchwork of corporate disclosures, many of which have a strong public relations tone but little data support.

Figure 4 Global Reporting Trends in Mining — KPMG 2003

Disclosure	Traditional Mining Bases*	Emerging Countries
Resource and Reserve Information	90%	<20%
Executive Remuneration	90%	<20%
Corporate Governance Practices	100%	50%
Formal Risk Assessment Processes	95%	8%
Environmental and Social Issues	92%	NA

*Australia, Canada, South Africa, UK, US

NA - Not Available

Source: *Commodities Now*, 2003

The above chart shows that disclosure is an issue in the emerging markets in general, not just in Asia. While the global players are more forthcoming with information, even with the major players there are issues, as Trucost found in its December 2004 study of disclosure of environmental issues by thirteen of the largest metal miners. According to Trucost, "investors are not adequately

informed about key risk areas, particularly heavy metal emission and the management of tailings dams". These are both key environmental issues, which can have a significant impact on clean-up and reclamation costs, and hence profitability. However, the global focus is on more disclosure not less, with the ICM and the Global Reporting Initiative (GRI) agreeing on a standard of reporting for the sector (2002). Asian companies that want to tap global capital will need to address these standards.

We see the trend toward more disclosure in the sector in Asia as well. Companies operating in the global marketplace such as POSCO, China Steel, and Tata Steel disclose significantly more than their counterparts operating in predominantly domestic markets. Newly listed companies accessing the global equity markets such as China Shenhua, Vedanta Resources, and Yanzhou Coal have more significant disclosures than those with more regional equity focus.

Companies operating in the global marketplace disclose significantly more than their counterparts

The level of disclosure has increased in recent years, with China Shenhua Energy, the most recent public listing at the time of this report, disclosing considerably more than many of its counterparts. Other players such as Sheng Yu Steel of Taiwan, which is more than 60% owned by Japan's Yodogawa and Toyota Tsusho, have provided extensive reports and indicators on both the environmental and social reporting level, reflective of the focus of their key investors.

It is clear from the direction of reporting in Asian companies that the trend is towards more: more issues, more indicators, and more disclosure on issues of health and safety, environment and governance. While it is not entirely fair to say that the companies that do not report on these issues are not tracking or managing the risks, it is increasingly a red flag when disclosure is limited.

Government involvement The role that governments across the globe, and in Asia, play in this industry is a material consideration. Natural resources are considered key industries for many economies and are typically subject to tight government control. The processing and production of metals using critical natural resources is also considered a key building block of many nations' economies. The companies that began in these industries were often government-owned to start and typically remain highly regulated, with a focus on strategic supply relationships. State and local governments have control or influence over many aspects of the sector in Asia, which has an affect on corporate risk profiles at many levels. This influence can fall into several broad categories:

- **Land and mineral rights** In line with global trends, mineral ownership in Asia is maintained by the state in most countries. Metal, mining and cement companies are awarded concession rights by the central government to extract key resources for a fee. Concession terms can change at the discretion of the government. Because terms for the granting of these licenses can be opaque, there have been many instances whereby a change in government power can put into question whether a company has a right to operate a certain project
- **Equity ownership** Many of the listed companies in the sector were initially state-owned. Although there have been a number of listings,

Although there have been a number of listings, involving minority stakes, many of the companies remain government controlled entities

involving minority stakes, many of the companies remain government controlled entities

- **Supply chain influence** Many companies, particularly those that were once government owned, are required to source necessary raw materials, energy, and other supplies from designated suppliers. Transport services and power supply are often derived from state-owned entities
- **Import/export controls** Governments in the region regulate import/export of the products in the sector in order to ensure sourcing and sales meet government policy on industrial and economic development. Pricing, taxes, duties, and fees are all within the sphere of government influence
- **Preferential tariffs and subsidies** Several companies in the region are either harmed by or benefit from preferential tariffs set by regional governmental bodies. In the energy intensive industries, preferential energy rates are offered to allow local producers to be more globally competitive
- **Operating regulations** Environmental, health and safety standards are the clear top issue here. In most countries, regulations are in place but enforcement is inconsistent. This trend also affects foreign ownership, granting of production licenses, reserve recovery rate requirements, mining and production rights and new production facility approvals

Figure 5 Government Involvement in Certain Regional Companies

China Shenhua	83% owned by state-owned company after sale of new equity. Government set recovery rate requirements, transportation on government rail systems, power tariffs and dispatch
Yanzhou Coal	58% owned by state owned company; reliant on parent for power, health and employee benefits
Chalco	45% owned by state-owned entity; reliant on government subsidized energy source
China Steel	Partial ownership by state-owned entity
Vedanta Resources	Subsidiaries partially owned by state-owned companies. Equity sale from state-owned entities not yet legally approved. Restrictions on payments from operating units to Vedanta as parent, at which level equity and bonds are held

Source: ASrIA 2005

Long-term sector outlook

We see two key trends for the sector over the longer term. The first is further globalization as well established players increase their presence in Asian markets, typically via acquisitions. The metals and mining industry has seen a recent

wave of mergers and acquisitions both within countries and beyond borders. Certain countries, most notably China, are focusing on consolidating the industry within their borders to control and maintain profitability. However, across the globe, the metals and mining industry has been experiencing a wave of consolidations through acquisition in an attempt to reach new markets and reserves, and to lower costs. The race for resources is also taking companies further and further afield in search of higher-grade, longer-life reserves, bringing an unprecedented era of globalization to the sector.

The metals and mining industry has seen a recent wave of mergers and acquisitions both within countries and beyond borders

While we see many examples of the traditional structure whereby a Western MNC takes on projects in resource-rich less developed countries such as Indonesia, China, and Philippines, we are also seeing examples of Western MNCs purchasing equity stakes in large, privatized metals and mining companies in Asia — thereby exerting influence at a shareholder level rather than running the operations themselves.

The Western MNC is not the only player involved in this global expansion. Asian companies are also getting into the act. Many companies are purchasing single properties and projects, both in Asia and elsewhere. For example, there have been Chinese purchases of mines in countries such as Papua New Guinea as well as in Africa. There is additionally a new class of Asian company that has grown big enough to become a new MNC. As these companies travel offshore, they find their competition stiffer and need to compete at a global level. Steel companies such as POSCO, China Steel, and Tata Steel are examples of the new Asian MNC which are striving to meet global sustainability standards. And some players are doing well at setting the standards. Steel Dynamics, a research firm specializing in the steel industry, named Tata Steel the best-managed firm in Asia based on issues of profitability, ethics, environmental management, and competitive positioning among others. However, the question still remains as to how quickly standards are being implemented and the extent to which standards are being implemented in offshore as well as home facilities.

Asian companies are growing big enough to be the new MNC's

Perhaps the most interesting phenomenon is the foray of global Asian players into properties in the West, in markets such as Canada and the U.S., where the license to operate will inevitably be determined by more sophisticated communities and better developed regulatory and legal mechanisms.

The second key trend is accelerated growth and new listings by Asian players. Many governments in the region, notably China, see privatization as a means to attract both capital and technology to their metals and mining industry, and indirectly to their overall development. Indeed, one crucial question for investors will be the extent to which the listing process can become an effective tool for funding higher performance standards for China's emerging sector leaders, many of which have lacked resources to address sustainability challenges.

OPERATING CHALLENGES: RAISING ENVIRONMENTAL, HEALTH AND SAFETY STANDARDS

As impacts have risen and public expectations have matured, governments have begun to move toward more active enforcement

Investors in the Asian metals and mining sector have traditionally looked past the sustainability standards of Asian operators, confident that neither regulators nor markets were ready to enforce developed market norms. As impacts have risen and public expectations have matured, however, governments have begun to move toward more active enforcement. For investors, this will mean higher and sometimes unexpected costs as companies are forced to anticipate a new pattern of stricter regulation. Though it is also notable that adoption of higher project standards may also help mitigate project risks and the potential of unexpected risk-related costs further down the line.

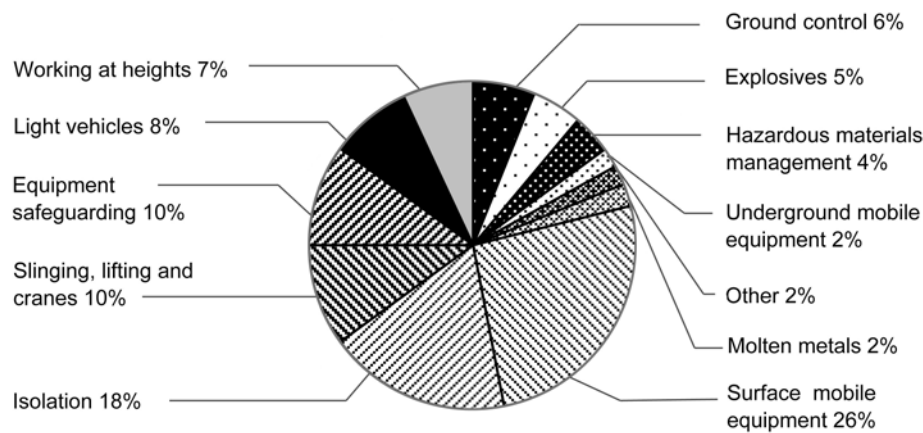
The metals and mining business, by its very nature, is disruptive to the environment with operations that carry significant environmental, health and safety (EHS) risks. A review of sustainability reports prepared by industry leaders quickly highlights issues of key concern in the area of environmental, health and safety:

Environmental issues The overall impact on air, land, and water quality is key. Disruption to natural habitats and biodiverse areas, energy usage and supply, greenhouse gas and other emissions, water usage and supply are key issues of importance. During the life of a project, one of the most crucial considerations is how waste products — especially mine tailings and other major effluents such as sludge — are handled. In the steel industry, recycling is possible. However, where mining effluents have leaked or been dumped into rivers, ground-waters or the sea it can lead to major pollution issues which can become global as well as local headline news, with major impacts on the reputations of mining companies as well as creating potential costly clean-up and litigation costs. See the Newmont Mining example, Figure 11.

Health issues Key issues which affect human health are elevated noise levels, air quality and chemical emissions, dust and residue in mining operations which affect respiration, direct and water-based exposure to toxins and chemicals with adverse health consequences. Health and medical standards, communicable diseases such as AIDs, and other health issues prevalent in mining communities are important issues that are beginning to be addressed in the Asian context.

Safety issues Simply put, safety is measured by injuries and fatalities. As an example, BHP's sustainability report graphically demonstrates incidents of safety concern in their organization, and highlights graphically the typical safety concerns related to mining (although percentages of incident will differ):

Figure 6 Significant Safety Incidents by Fatal Risk Control Protocol and Incident Type



Source: 2001/02 to 2003/04 — BHP Sustainability Report

The level to which Asian players address the issues of sustainability varies considerably and is highly dependent upon the industry. The global steel players such as POSCO and Tata Steel have fully integrated sustainability programmes, with emphasis on environmental, health, and safety standards in line with their counterparts in other parts of the globe. Indeed, Asia's leading metals companies are increasingly in step with global reporting norms for the extractive industries in terms of integrating, managing, monitoring and reporting on sustainability issues. However, reporting by these companies is substantially better than the limited disclosure common to the smaller players in Asia.

Despite the emergence of examples of better sustainability reporting, it is notable that few Asian companies have set the bar beyond government compliance. It is argued by many NGOs that even the multinational players revert to local government compliance when operating overseas, even if such standards are below the standards of their home country. This clearly illustrates the point that government compliance as a standard has significant drawbacks:

It is notable that few Asian companies have set the bar beyond government compliance

- Regulatory levels are by no means standardized from country to country
- In most countries, it is not a question of EHS standards existing, but how these regulations are interpreted, monitored and enforced. With low governance and transparency standards in many resource-rich Asian countries, these questions are not always clear, and can be subject to sudden change with little public consultation. Companies may be open to greater risk than can be quantified by relying on such inconsistent standards
- Government is one of the important stakeholders with which companies must contend. Government compliance alone may or may not meet the needs of the other stakeholders, especially in a region where political

change is bringing a new and more diverse range of views to bear on development choices

The question then arises as to what standards a company in the industry should operate under. Global organizations such as the Global Mining Initiative, World Steel Organization, Cement Sustainability Initiative and others are attempting to address the issues and set the standards for companies in the industry.

Health, safety and labor supply — key issues for China

China has come under global scrutiny due to the large number of mining related deaths in the country's large and geographically diverse mining sector

To illustrate the point of how EHS issues are becoming more material in the region, we can look to rapid changes in the enforcement of mine safety in China. China has come under global scrutiny due to the large number of mining related deaths in the country's large and geographically diverse mining sector. In 2004, more than 6,000 coal miners died, accounting for 80% of such deaths worldwide. In the first three months of 2005, the number of coal mining incidents increased 21% over the comparable period to 1,113.

One of the most recent incidents, at the Daxing mine, is sadly a typical example. In this incident more than 100 people died due to flooding in the mining shaft. "This is a typical case in which mine owners make money, miners lose their lives and the government pays the bill," Li Yizhong, State Administration for Work Safety director, was quoted as saying. Li has publicly pledged to strengthen safety supervision in China, but has also publicly expressed concern about the effect of corruption on the process.

Li subsequently noted that there are five main types of collusion between government and coal mines: i) officials or SOE leaders invested in small coal mines; ii) officials set up coal mines or helped their relatives to set up illegal coal mines; iii) officials accepted bribes to issue certificates illegally; iv) officials assisted illegal coal mine operations; v) officials helped conceal coal mine accidents.

The chief causes of mining disasters can therefore be summarized as lack of management rigour and discipline, poor culture of safety and poor enforcement of regulations, often due to corrupt regulators who also are owners or part owners.

The negative pressure and embarrassing publicity pressed the Chinese government to start taking action. In February 2005, the work safety agency was upgraded to a full ministry, with a new head, to strengthen the office's ability to get things done. A full plan of action including stronger guidelines, legal framework, and tougher law enforcement is being discussed. Higher compensation for victims is also being considered. Critics have blamed the lack of enforcement and supervision of safety standards, not the existence of the laws themselves. Corruption and confusion as to which level of government is responsible for enforcement, as well as conflicts of interest resulting from

ownership of mining companies by employees of regulatory bodies and government entities (for the most part undisclosed), further contribute to the problem. Thus, the real test will not be on what regulations and standards are put in place, but how strictly these are enforced.

However, the government's attempts to force government officials to relinquish their financial stakes in coal mining have proceeding apace, as reported by the Beijing News (2 November 2005). According to the paper, by 20 October, 4,578 officials had reported investments in coal mines totalling 653 million yuan (US\$80.5 million). Of the amount, 473 million yuan (US\$56 million) has been withdrawn. Those who have withdrawn shares from coal mines include 3,002 civil servants and 1,576 heads of State-owned enterprises.

What this means for the mining companies and the investors in these companies is, at least initially, more costs. The Chinese government put aside Rmb3 billion (US\$800 million) to improve safety in state-owned mines. Private enterprises are expected to make similar investments. In its recent 2004 annual report, Yanzhou Coal disclosed a 5% increase in costs per tonne of coal sold from FYE 2003 to FYE 2004 due to improvements in safety standards (accounting for 20% of the total increase in costs during the year). This amounted to an increase of RMB 4.90 per tonne of coal sold, or a total increase of RMB159.5 million spent in 2004 due to increased safety standards. Although a small percentage of its total RMB 10.6 billion revenue, it does demonstrate that funds are being earmarked for safety improvements. China Shenhua Energy stated in its May 2005 offering memorandum that it "may be required to devote substantial financial and other resources" to comply with strengthened safety regulations in China. For those companies that do not sufficiently ensure safety standards for their workers, hefty fines and regulatory sanctions can be expected on top of lost production time.

It is interesting to note that Hong Kong listed Chinese mining companies, in response to the perception of rising operating risks, now lead the region in disclosures on this topic, based on the most recent public offering disclosure statements. There is scope for improvement however. While the current cost of safety standards is outlined, what the companies are actually doing to ensure safety is not quite clear, leaving one to wonder if the efforts are sufficient or even in line with global standards.

Hong Kong listed Chinese mining companies, in response to the perception of rising operating risks, now lead the region in disclosures on this topic

Indeed, while investors need to be alert to hard investment costs, there are also important investments resulting in higher operating costs which need to be made in staff. The safety problems faced by Chinese companies are partially a direct result of a lack of trained safety professionals in China and the region who can identify and rectify problems before they become catastrophes. Ironically, the dismal safety record of many of the players in the industry only adds to the negative image that mining and metals companies have had in recent years, and this has contributed to a severe global shortage of qualified skilled and semi-skilled workers wanting to go into the industry.

According to recent comments by Paul Mitchell of ICMM, the current total number of students in university mining courses in the United States is 578, only a quarter of what it was in 1938, despite the explosive growth in the overall number of students from 1938 to 2005. The shortage is even greater in

Asia. Combine a reduction in the number of students studying these industries and operating methodologies, that in both the extractive and production sides of the business are becoming increasingly technical, and the sector seems certain to face continued challenges in building the infrastructure needed to cope with higher standards.

Ok Tedi copper mine: corporate lessons and business losses

For Asian investors focusing on the potential impact of higher standards, it is important to appreciate the scale of losses that can result from projects which inaccurately assess and manage the environmental and social risks. Some of the best researched examples of problems in the region involve foreign-invested joint ventures due to the disclosure obligations common to foreign companies.

The Ok Tedi gold and copper mine in Papua New Guinea provides a vivid example of the complexities faced by mining companies in managing and assessing EHS risks. Ok Tedi was majority (52%) owned by BHP until 2001. BHP's initial mining plan called for tailings to be managed through landfill and damming. However, landslides and other topographical changes curtailed this plan. The tailings were then disposed of in the local river resulting in polluted waterways, dying fish and disruption to local livelihoods such as fishing, as well as evidence of illness among the local population.

BHP determined that the environmental impact and the resultant cost to clean up the project and continue operations was not economically viable, and decided to close the mine. There was an outcry from the local community who derived their livelihood from the mining company village and its operations, and pressure from the local government which was earning revenues from the operations, not to close the mine but to come up with a solution to solve the environmental problems.

Figure 7 Unwinding the Ok Tedi Debacle

"It is clear that the environmental damage caused by the Ok Tedi mine is greater than expected when the mine opened and that it is now a serious problem affecting many people along the Fly River system.

However, it is essential to bear in mind that any hasty and poorly planned decision to close the mine could have had even worse consequences for the well being of these people and for Papua New Guineans generally."

The Prime Minister, Sir Mekere Moratau, on 26 September 2001, announcing approval by the National Executive Council of an agreement for the withdrawal of BHP Billiton from the mine

"Ok Tedi is a complex issue for BHP, with competing environmental impacts and social and economic benefits. We have indicated to the other shareholders that we thought the best approach to this dilemma was to close the mine early. However, the PNG Government does not want the mine to close earlier than ten years from now which would be its economic life. We understand the reasons for its position.

As a result we have come to the view that it would not be appropriate for BHP to have any direct involvement with the mine beyond the point at which all parties can agree on how best we exit."

BHP Chairman, Don Argus, at the 2000 BHP Annual General Meeting

Source: OK Tedi Mining Perspectives

Once the scope of environmental damage was acknowledged, the interests of the government and the mine operators diverged. After lengthy discussions and negotiations, BHP's shares were transferred to a new entity, PNG Sustainable Development Programme Ltd. which would re-deploy dividends from the project back into community programmes. BHP agreed to provide \$100 million in an interest free loan for environmental cleanup and other projects and to relinquish its rights to future earnings from the operations.

The cost to BHP: The total project cost was US\$1.9 billion, twice the expected amount. BHP took a write-off of US\$416 million in assets in fiscal year 2002 as a result of the transfer of the shares. The company agreed to provide a US\$100 million interest free loan for funding of the new project company, plus dredging costs of US\$35 million per year. In the year that the write-offs were taken, earnings per share were reduced 7% as a result of the write-offs. Additionally, the company paid what must have been extensive legal costs and undoubtedly suffered a cost in terms of management time. A previous claim in 1996 resulted in an out of court legal settlement of US\$28.6 million. If the tailings issue had been adequately addressed at the outset, via an adequate EHS assessment, the costs of an acceptable solution could potentially have been assessed upfront and might therefore have been built into the financial model. It was an expensive lesson for the company which has subsequently become a frontrunner in sustainability practices, going on to win the 2005 Company of the Year Award from the Business in the Community Awards.

The Ok Tedi case provides a concrete example of how badly managed environmental risks can destroy project economics. In the absence of full disclosure, the task for investors in Asia is to assess the compliance and risk appetite of managements and local governments. It is increasingly clear that Asian governments are re-evaluating previously lax standards. In a number of countries around the region, name and shame strategies are becoming increasingly common as are rapid and tough regulatory sanctions, raising the potential for an unexpected and inevitably higher pattern of EHS spending.

The Ok Tedi case provides a concrete example of how badly managed environmental risks can destroy project economics

As the long-term costs of bad EHS enforcement have become clearer, Asian regulators have come under greater pressure to implement higher standards for the Asian listed universe of metals and mining companies. The first phase of this process — more aggressive enforcement for foreign-invested joint ventures — is already evident as the Ok Tedi example makes clear. At the same time, the Chinese government's strategy of requiring higher EHS spending by listed companies is a clear indication that the issues now have a distinctly local relevance as public expectations about EHS impacts rise.

For Asian investors, this will mean that cost models and earnings expectations for Asian metals and mining companies will need to take into account higher spending levels as companies come under pressure to meet more realistic EHS spending levels. This process also has the potential to introduce a new level of uncertainty as investors, typically focused largely on commodity pricing cycles, will need to factor in a regulatory cost cycle as Asian governments move toward more aggressive enforcement.

PROJECT REALITIES: ASSESSING NECESSARY COMMUNITY AND INFRASTRUCTURE INVESTMENTS

Due to the broad impacts of projects in the extractive and metals sector, the license to operate is a crucial element of corporate strategy

Perhaps the most fundamental concept in corporate social responsibility is the "license to operate" — the ability of a company to enjoy sustained support, not just from shareholders but also from communities, regulators, and customers. Due to the broad impacts of projects in the extractive and metals sector, the license to operate is a crucial element of corporate strategy and a company's ability to realize long-term project returns. In the previous section, we highlighted the need for specific operating cost items crucial to addressing the mitigation of EHS risks. A second, and equally significant, cost component is long-term investment in infrastructure and community resources. These costs, which are dominated by fixed asset investments in transportation, housing, schools and hospitals, provide the basis for the type of long-term community engagement necessary to support a company's license to operate. For investors in Asia, the challenge is to assess whether companies have a realistic or merely reactive stance on this crucial area of spending.

Figure 8 Mining and Minerals Sector — Shaping the License to Operate

The mining and minerals industry faces some of the most difficult challenges of any industrial sector and is currently distrusted by many of the people it deals with day to day. It has been failing to convince some of its constituents and stakeholders that it has the 'social license to operate' in many parts of the world, based on the many expectations of its potential contributions:

- Countries expect that minerals development will be an engine of sustained economic growth
- Local communities expect that the industry will provide employment, infrastructure and other benefits that counter the risks and impacts they experience and will leave them better off than when the project started
- The industry's employees expect safer and healthier working conditions, a better community life and consideration when their employment ends
- Local citizens and human rights campaigners expect companies to respect and support basic rights, even when they are operating where governments do not monitor standards
- Environmental organizations expect a much higher standard of performance and that the industry will avoid ecologically and culturally sensitive areas
- Investors expect higher returns and have shown considerable concern about the industry's financial results
- Consumers expect safe products produced in a manner that meets acceptable environmental and social standards

Source: WBCSD 2002, *Breaking New Ground: Sustainability in the Mining Sector*

The metals and mining industry requires land acquisition and new development for continued and sustained growth. With each acquisition and new development project comes a number of related community, infrastructure, and capital investment projects necessitated by the need to both gain acceptance in the community and develop the necessary labor force and infrastructure to support the operations. The further afield the race for resources extends, the more likely that infrastructure is not in place for these projects, and the more the need for up-front investment to support the projects. Effective engagement with the local communities and other potential interested stakeholders at early stages of the planning process is potentially one effective way of assessing local concerns and needs as well as drawing on local knowledge which may have a relevance to the project. Such engagement may positively inform projects and help reduce the potential of project investment risks. Additionally, most countries require that any environmental and social impact of operations be minimized and the land restored to usable condition at the end of the project. A sensible and environmentally and socially sensitive closure plan is also as vital as a well-constructed operational plan. It is just as important to calculate the costs associated with these remedial project plans and the impact of those costs on share value, as it is to calculate the production profile and reserve analysis of the project.

A sensible and environmentally and socially sensitive closure plan is as vital as a well-constructed operational plan

In its extensive work on the mining sector, the WBCSD highlights the following social issues as crucial for successful project implementation: relocation, migration, infrastructure improvements, health, education and social change. We would add general labor supply issues and the distribution of benefits between local and either national or international communities as additional challenges. If any of these issues are not addressed, the result is all too often a disruption to the business, either as a result of social tensions, social strife, or lack of human and other resources for the business.

The first step for any green-field project is to address the concerns of inhabitants currently making their living in the region of the project. A requirement for approval for business licenses from most governments requires a plan to address relocation of inhabitants. Adequate compensation and equitable treatment of local inhabitants can prevent common and potentially controversial disputes over land rights and local consent.

Migration to the operations site is another issue that can complicate efforts to establish and maintain local consent. Indeed, the lure of employment and the need for workers with scarce skills often brings in new workers and residents to the community. If not handled well, or if the local community does not feel that it has been equitably treated, tensions can brew and social clashes and disturbances may occur. Tensions may be between local people from different regions, or between foreign workers and locals, or between any transplanted group and other inhabitants.

There are two approaches to sourcing labor, with advantages and disadvantages. The first is the fly-in/fly out approach whereby workers work but do not live at the site, and the second is to bring workers in from an outside location and set up a company town to support the operations. The former is less disruptive to the local community, but does not necessarily bring similar economic benefits to the local community. The costs are also high in

terms of travel and wear on the employees who are working away from family and familiar surroundings. The second method is easier for employees, brings income through support services to the local community, and also allows for training and knowledge transfer for future job prospects for local workers. However, the social impact is greater, and closure of the operations becomes more complicated in order to ensure that the local community is not left completely devoid of sustainable livelihoods.

Better access to health and education is one of the most important community benefits that can be offered by companies operating mining projects in remote areas

Better access to health and education is one of the most important community benefits that can be offered by companies operating mining projects in remote areas. Improved educational programmes and facilities are generally offered to employees and their families. Once established, however, they often become community resources.

Originally, community support was considered adequate to provide the physical improvements: school buildings, medical centers, and community centers. Global players and best-practitioners in the sustainability realm now see the need to support and grow the training and development of the community for best benefit while the facilities are operational, and to ease the transition when the operations are closed. Schools with teachers, books, and supplies, are financed by the company. Medical centers with staff, health insurance and health education are other offerings. These benefits are offered to employees to ensure a supply of healthy workers for the operations, as well as to others in the community to offer a broader range of acceptance in the community.

Figure 9 BHP's Strategy on Community Investment

The resources industry has had a chequered history in relation to creating a sustainable positive legacy. It has tended to take a paternalistic approach with limited community consultation and has been inclined towards technical solutions such as the building of infrastructure (schools and hospitals) without focusing on the need to engage communities in the process or to train and develop local people to manage these facilities.

We recognise a need to more actively involve communities in our development programmes if the programmes are to achieve truly sustainable long-term outcomes, and to do this effectively we must increase the relevant skills and expertise of people within the Company. It is only by building human and social capacities within the community that we will leave a valuable legacy that outlasts the operation itself and ensures a positive future for communities beyond resource extraction.

Source: BHP 2005

Within the listed universe of Asian metals and mining companies, we can look to two examples of Asian companies offering support for the community in which it operates, and the positive affect it has on both the community and the business.

In India, there is an expectation of company support for the community. Tata Steel demonstrates this point strongly in the services it offers to its company town, Jamshedpur, and the neighboring community. Tata installed sanitation and clean water sources to the town. It supported the building of schools, hospitals and community centers, as well as financial support for the schools and medical centres (staff and supplies) as well as the cost for the community to attend these programmes through tuition payments and free health and medical benefits. Commentators have noted that, in many respects, Tata provides a cradle-to-grave corporate welfare system that is perhaps uniquely possible in India due to its low cost structure. The company has trimmed operations to make it more global-efficient and competitive, cut its work force in half, and yet still pays salaries to its laid off workers — and it hasn't had a strike in 75 years. The company town itself has signed onto the UN Global Compact Citizen's Programme supporting environmental, social and labor rights. Tata Steel lists as one of its key sustainability challenges its obligation to meet rising quality of life expectations in the communities it serves.

In India, there is an expectation of company support for the community. Tata Steel demonstrates this point strongly

While not all companies can afford to provide lifelong salaries to laid-off workers, Tata Steel is not alone in realizing that community support is vital for smooth operations and avoidance of strikes and work stoppages. While most companies in the region are far from offering the levels of support provided by Tata, some form of housing, medical and training support are often provided to employees. Many companies offer community development programmes, particularly related to education, health and alternate livelihood training.

Banpu, the Thai coal and power company, has also worked to reduce social impacts and build human resource capacity for its operations through a community development programme. Banpu Village was formed when villagers were forced to relocate upon expropriation of their land by the Thai government. Banpu came in as the mining sub-contractor, paid compensation to the villagers, established them in a new location, provided alternative housing and provided community infrastructure. The company has also established a skills development programme and other training initiatives to train potential workers as well as provide alternate livelihoods for the local community.

The key concern for investors when evaluating a company's community investment is whether actions have been taken in consultation with a variety of stakeholders and whether enough has been done to meet the needs of both the company and the local community in order to curtail resentment, replace lost livelihoods and provide for a sustainable way of life both during and after the project life. The second related concern is the projected cost of these programmes and whether they have been adequately accounted for in the overall project budget as up-front project costs.

The key concern for investors when evaluating a company's community investment is whether actions have been taken in consultation with a variety of stakeholders

While the cost of community support activities is often not large, projects requiring significant infrastructure investment often face material long-term investment commitments. Indeed, companies with operations in remote locations must often provide their own infrastructure for basic utilities such as access to water, power and transportation. For the operator, these investments are a necessary cost, while for the local community provision of reliable utilities is often a valuable benefit which can change the economic dynamics of a community. For the investor, the issue is whether there is value in the provision

of such infrastructure projects as stand-alone assets and how the assets are valued by the company. China Shenhua and Yanzhou Coal both support their own local railway system to bring coal to the national railway line.

Using Yanzhou as an example, purchasing the local railway from its state-owned parent made sense for the operations: instead of paying a fee to the parent company, Yanzhou can now pass the cost of transport on to its customers and realize additional revenue. However, it is uncertain whether the railway will have value, or what the value would be upon closure of the coal mine. The value of the railway would be directly in line with the restoration and reclamation plans of the land at the mine site. While the cost of the transportation system would be depreciated over time, the asset is held at a value equal to the cost of purchase less disposition value. The disposition value, and how that was obtained, is not disclosed. An incorrect valuation would lead to a write-off of the asset upon mine closure or sale, which would have a direct impact on the profit and loss statement.

Finally, a key consideration in metals and mining projects is mine closure. This touches on environmental issues because companies are legally required in most countries to restore affected land to a usable state. Mine closure also raises important social issues related to the community and what is left for the community when the company as benefactor goes away. Most companies include restoration costs in the project budget, with reserves held against these costs. Given the sensitivity of mine closure, community sustainability plans are often built into mine closure plans to ensure smooth transition for the community.

Although most Asian mining companies claim to include the costs of associated community projects, environmental restoration and other capital costs into project costs with funds established in reserve for future costs, it is difficult to judge whether these reserves are sufficient. Any costs beyond the reserves are expensed directly out of corporate earnings. This raises two issues for investors: (1) upfront costs for projects are high, often with a substantial period of operating losses before the projects reach profitability. The higher the upfront costs, the more pressure is placed on producing a strong revenue stream quickly in order to reach the breakeven point and produce project returns acceptable to investors, and (2) if estimates on costs are wrong, the effect can often be a direct hit to corporate profits with potential impact on share valuation. Quantifying future costs and needs is difficult and, as sustainability requirements change, so can the costs to meet these requirements. As a result, companies and investors must be alert to changes that might materially affect the profit profile of the project and its effect on company valuation.

ASIAN STEEL, ALUMINUM, AND CEMENT: WATCH THE ENERGY APPETITE

For investors in Asia, one of the biggest challenges can be to make a correct assessment of pending policy changes. This is a particularly important issue for investors in energy-linked sectors due to the history of heavy government involvement. For investors in the metals, mining and building materials sector, the question of how Asian governments manage local power and energy policies is of growing importance as rising global energy costs have placed pressure on existing pricing and subsidy structures which have traditionally benefited large users.

For investors in Asia, one of the biggest challenges can be to make a correct assessment of pending policy changes

Figure 10 High Energy Usage — A Growing Risk?

POSCO requires a staggering amount of energy each year and the reduction of energy consumption has been a key element to improve cost competitiveness.

POSCO Website

Aluminium production requires a continuous supply of electricity in large quantities...Electricity cost is the second largest production cost component of our primary aluminium production. All of our five smelters benefit from various policies that allow them to purchase electricity at reduced prices. If these preferential treatments are cancelled by the PRC government or not renewed upon expiration, or if electricity prices or charges were to increase for any reason, this would increase our unit production cost for primary aluminum and have an adverse effect on our financial condition and results of operations.

Chalco 10 — K 2004

[Cement production is] an energy intensive process. It requires the equivalent of 60 to 130 kilograms of fuel oil and 110 kWh of electricity to produce one ton of cement (depending on the cement variety and the process used).

WBCSD — Cement Sustainability Initiative Report

The production of metals is one of the most highly energy intensive industries. As a result, companies operating in this sector tend to be among the highest energy consumers in most countries. Short-term increases in energy costs cannot, in most cases, be passed on to the customer due to the constraints of commodity market pricing. Fuel and electricity costs directly affect profit margins, with a company's ability to source energy resources at favourable prices a determining factor for profitability and corporate viability.

For investors, there are two near-term energy-linked risks for Asian metals and building materials producers. First, is the need to address new operating policies appropriate to higher energy costs. Second, is the need to assess country- and company-level greenhouse gas emissions. In both cases, a company's risk exposure will reflect not only company usage or emissions

patterns, but the ability of Asian governments to move toward more responsive policies which reflect longer term policy realities.

China's policy toward the Aluminum Company of China (Chalco) illustrates this point well. Chalco has been awarded preferential electricity prices by the Chinese Government, and this is clearly recognized as vital for the company to continue to maintain its margins and profitability. However, China is also looking to enforce its "coal-cost-pass-through" policy by increasing electricity prices. In trying to support its coal production, aluminum production and utilities sector, the government is caught in a conflict as policies which assist one sector are bound to be a detriment to the other. Any decision by the government on dealing with this dilemma will inevitably have an effect on the companies operating in that sector.

Most companies in the metals sector are focused on finding and maintaining inexpensive sources of energy. The companies that can benefit from favourable energy prices through government subsidies or long-term supply contracts fare well while these contracts are in place. However, the risk to company profitability is that government policies change or contracts expire with replacements at less favourable terms. There are experts who predict that these contracts and policies will change as they become economically unviable for governments to maintain.

POSCO and China Steel both have trend-setting operations that derive electricity from internal sources

Most companies that have the means put considerable financial resources and efforts into looking for energy alternatives and new operating technologies which are energy-efficient. POSCO and China Steel both have trend-setting operations that derive electricity from internal sources: either through electric power recovery facilities or conversion of production gases for power generation. For example, POSCO has ventured directly into the power sector with investments in independent power projects both in Korea and elsewhere. China Steel recaptures process steam and has developed a secondary source of income by selling the power. The major players in the cement industry are researching and developing processes which rely on recycled material for energy, rather than traditional energy sources, as a means to increase supply and reduce costs. The gap between those companies which can afford to put resources behind technology developments and those that cannot will surely widen as time goes on, with the potential effect of encouraging further consolidation in the industry.

The second key effect of the energy intensity of the sector is the fact that, as key consumers of energy sources, the sector is also a key producer of CO₂ and other greenhouse gases. As Asian governments begin to address global obligations to rethink greenhouse gas emissions, the region's leading metals companies are certain to face pressure to take steps to reduce their direct and indirect emissions. While direct obligations under the Kyoto Protocol are limited across the region, Asian governments and large emitters are all studying the effectiveness of the EU Emissions Trading Scheme and other market-based tools for encouraging lower emissions.

THE LONGER TERM: HIGHER RISK, GLOBALIZATION, AND NEW TRANSPARENCY INITIATIVES

We see three major sustainability-linked trends which have the potential to influence investment opportunities in the metals, mining and building materials sector over the longer term. Over the next five to ten years, the metals, mining and building materials sector in Asia will make a transition to a more mature, globally oriented business model which will increase the likelihood that nagging and often unaddressed sustainability challenges will become a more transparent part of corporate cost structures. For investors, this will mean that traditional cyclical investment strategies may need to be tempered by an assessment of the potential for higher cost structures as companies are obliged to make a more public commitment to sustainability management.

There are three principal drivers for this transition:

- New projects will have higher risk and cost structures
- Globalization and consolidation will make better sustainability practices a focus for competition
- Greater transparency

For the mining sector, the challenge of moving to a more sophisticated model for project management will be a natural response to fundamental realities of the sector. Across Asia, there remain large remote areas where mineral reserves have not been fully evaluated or exploited. Indeed, much of the incremental development in the Asian mining sector will take place in increasingly distant settings which lack basic transportation or community infrastructure. Many of the remaining reserves will also be more technically difficult to exploit as easy access surface deposits have already been developed in many countries.

For the mining sector, the challenge of moving to a more sophisticated model for project management will be a natural response to fundamental realities of the sector

For most mining companies, the most profitable opportunities for expansion come from projects which have a multi-stage development profile, making it possible to leverage off existing infrastructure and equipment investments. As mineral exploitation in Asia gathers pace, however, the mix of new project opportunities for most players is shifting toward higher risk and higher cost projects in increasingly remote locations. This is a trend which can be clearly observed as global mining companies and more experienced Asian players seek to move into new Asian markets. The projects typically offered to new market entrants almost inevitably demand much higher levels of investment in infrastructure, especially transportation, as well as in more sophisticated technologies.

Companies pursuing projects in countries with rich potential reserves, such as Indonesia and China, are typically offered market access only in exchange for commitments to significantly higher risk and higher cost projects. This trend has obvious implications for investors evaluating sustainability issues because these projects, almost by definition, have greater exposure to sustainability risks and tend to require more sophisticated development strategies.

This trend toward higher cost projects dovetails with the second trend which we see emerging in the metals and mining sector over the longer term — accelerating globalization and consolidation. With Asia's rising importance in commodity materials markets, both as a supplier of resources and end product and also as a processor and consumer, it is inevitable that major players have been looking to increase their presence on the ground. Indeed, in the wake of the Asian Economic Crisis, the cement sector saw a number of significant transactions as global players such as LaFarge, Holcim, and Cemex bought stakes in prominent local companies. All of these investments have brought with them fresh capital, technology expertise and a commitment to higher sustainability standards.

While global players may have been guilty of violations of sustainability norms in Asia in the past, it is now apparent that the global players tend to bring higher standards to bear on projects which they undertake. Indeed, the Chinese government frequently makes demonstrated EHS performance a key criterion in considering foreign partners for domestic projects. This is often one key area where global players can claim a meaningful competitive advantage over better positioned domestic players. At the same time, Asian governments are increasingly willing to see undercapitalized local players which are incapable of meeting basic sustainability standards be taken over by larger players. In many countries, this marks a departure from past policies that tended to treat metals and mining as strategic national industries which were often protected from foreign competition and ownership.

Recent developments in Indonesia, China, and India offer vivid reminders of the complex political and business ramifications of managing EHS risks

Ongoing globalization and consolidation will accentuate the focus on long-term competition in the sector, a move that has the potential to enhance the competitive importance of long-term project management and sustainability. Recent developments in Indonesia, China and India offer vivid reminders of the complex political and business ramifications of managing EHS risks. While the Indonesian government has pursued a highly public conflict with the Indonesian subsidiary of Newmont Mining, the Chinese government has become increasingly willing to sanction even the largest companies for violations of EHS regulations.

Figure 11 Newmont Mining: How Stakeholder Problems Can Multiply

Perhaps the most recent example of a complex conflict stemming from unaddressed stakeholder issues in the Asian mining sector involves Newmont Mining in Indonesia. The Minahasa Mine is a gold mining operation in Sumatra, Indonesia. A local environmental NGO has taken on the plight of certain villagers who claim they developed skin diseases and other health problems from exposure to water from the local bay, allegedly polluted by the mine tailings that were released into the bay in a submarine disposal tailing system. Conflicts between Newmont and the local community have a long history and have touched on a classic range of sustainability issues:

- Controversies over the land rights grant and the payment of concession fees to the central government
- Legal conflicts over the project's obligation to pay local versus national taxes
- Concern over the management of the mine closure process and impacts on the local community
- Disputes about the appropriateness of a submarine disposal technology for mine tailings which is not used in developed countries

It is premature to assess the full impact of this dispute on Newmont, but the controversy has highlighted a range of problems for investors in terms of disclosure, near-term financial impact and other projects. According to a review conducted by Trucost, Newmont failed to mention project environmental issues in its 2003 financials, although it was mentioned in 2004. Trucost also states that Newmont was seeking to bar motions related to the Indonesian operations at its 2005 shareholders meeting. The company has increased its accruals for environmental obligations and reclamation costs, which has a direct impact on company profitability. Trucost calculated a "damage" value of US\$65 million, which would represent a 15% hit to 2004 earnings of US\$450 million if realized. In addition, there is the potential negative effect on Newmont's future business in Indonesia, as well as, more importantly, their current business in Sumbawa, east of Java, at Batu Hijau. Batu Hijau is Asia's second largest copper mine and a current producer of copper and revenue for Newmont. The Batu Hijau operation also utilizes the submarine disposal method for tailings although further offshore and deeper into the sea.

Earlier in this report, we highlighted poor disclosure as a cross-cutting issue for the sector. Indeed, the lack of verifiable disclosure on a broad range of sustainability issues is notable for all but the largest and most global Asian metals and mining companies. Disclosure on sustainability challenges is noticeably higher for foreign companies involved in Asian projects. Moving forward, however, it is clear that pressure for improved disclosure — both for investors and for the public — is rising often as a result of pressure from Asian governments which are increasingly using access to equity market funding as a tool for improving standards. A second source of pressure will be competitive pressure as the top tier of Asian metals and mining companies begin to seek access to overseas resource and product markets where regulators and the public insist on a higher standard of disclosure. This dynamic has been readily apparent as Asian companies increasingly seek to invest in more tightly regulated markets which rely on higher disclosure standards to establish a company's license to operate.

The lack of verifiable disclosure on a broad range of sustainability issues is notable for all but the largest and most global Asian metals and mining companies

The metals, mining, and building materials sector has increasingly become a focus for industry standard-setting and disclosure exercises which have the potential to shape the competitive landscape. Efforts by leading developed market competitors, such as those championed by WBCSD, reflect the realization that individual companies stand to benefit from more proactive industry-wide efforts to define acceptable standards. As Asian governments ratchet up EHS standards and more Asian companies venture overseas, it is natural to expect that more Asian companies will recognize the competitive advantages of being able to demonstrate an ability to meet international performance standards.

One crucial part of the motivation for meeting more transparent standards is that it provides a bulwark against often inconsistent and unpredictable demands made by host governments. While local companies often pride themselves on an ability to win projects by relying on political access for competitive advantage, companies operating outside of their home markets are routinely vulnerable to outsized demands and opaque political practices. Indeed, this is one area where many Asian companies have yet to define clear or transparent norms. As more Asian companies expand activities around the region and further afield, this has the potential to become a differentiator for companies looking to avoid higher than normal "taxes."

The concept of tracking mineral sources for their adherence to sustainability principles is just beginning to be explored in the metals and mining sector

A final driver for greater transparency will be supply chain considerations. The concept of tracking mineral sources for their adherence to sustainability principles is just beginning to be explored in the metals and mining sector. Just as in other sectors — most notably retail and wood products — discussion has initially focused on questions about the location and conditions surrounding raw material sourcing. For example, BHP has conducted product stewardship and life cycle studies of some of their products to determine energy efficiency along the process. Placer Dome is working with WWF to develop a sustainable supply chain certification similar to that of the wood products industry. Many of the global cement and steel companies are investing in new products and technology which are more energy efficient, such as cement alloys and lighter metals for cars which can reduce fuel consumption. This has the potential to reinforce the widening gap between top-tier companies that can afford to keep up with these trends and new technology, while the laggards struggle to fund new initiatives.

INVESTOR QUESTIONS FOR COMPANIES

For extractive industries

Management

- Do you have a sustainability policy? Do you have an environmental management system?
- What was and is your engagement process with stakeholders? Who are these stakeholders?
- Do you report on ESG issues at the project level?

Project specific policies

- Are your operations in conservation areas? Will bio-diverse or sensitive forest or land be affected?
- Do any of your projects involve resettlement of local inhabitants?
- What programmes do you run in the community? How are your operations viewed in the community?
- Do you source your workers locally or bring them in from other areas?
- What training programs do you run for your workers?
- What processes do you use for the extraction of metal? Do you use environmentally sensitive chemicals or emollients?
- What do you do with the waste products from your mines?
- Where do you source your water? Do you recycle water? What do you do with waste water and liquids?
- How do you handle tailings?
- How do you control dust residues?
- How do you ensure ventilation in the mine?
- How do you manage noise from operations?
- What regulations do you follow? What permits do you have? Who signed them and when?
- Where do you source your power? What is your power source?
- What is your loss day injury rate?
- What safety measures do you have in place?

- Have there been any strikes or work stoppages?
- To whom do you sell your materials?
- How is it transported?
- Do your operations requiring the damming of any waterways? Have the environmental affects of this been addressed?
- What are the terms of your mining concession agreements, resource sales agreements and land rights agreements?
- Are there other key contracts and agreements which are crucial to your operations? Who signs them and when?
- Do you source supplies locally?
- What provisions and plans have you made for restoration after the mine ceases operations?

Strategic issues

- How much do you invest in R&D and new technologies?
- What are your plans for expansion, either locally or in other markets?
- What environmental provisions have you made?

For steel and metal production

Management

- Do you have a sustainability policy? Do you have an environmental management system?
- What was and is your engagement process with stakeholders? Who are these stakeholders?
- How transparent is your ESG reporting on individual projects?

Project specific policies

- How are waste and dust handled?
- What are recycled products used for?
- From where do you source your energy supply?
- What steps are you taking to be more energy efficient?
- From where do you source your water supply? Do you recycle wastewater?

- Are you using recycled materials or providing waste product for recycling where appropriate?
- What processes do you use?
- How do you reduce noise?
- What programmes do you run in the community?
- Where do your workers come from?
- What regulations do you follow? What permits do you have? Who signed them and when?
- What safety safeguards do you have in place?
- Have there been any strikes or work stoppages?
- To whom do you sell your materials?
- How is it transported?
- How much do you source your supplies locally?

Strategic issues

- How much do you invest in R&D and new technologies?
- What are your plans for expansion, either locally or in other markets?
- What environmental provisions have you made?

APPENDIX

The International Iron & Steel Institute established 11 indicators of sustainability. An average for each indicator was determined using inputs from the major global players, many of which operate in Asia (POSCO, China Steel, Tata Steel, Nippon Steel and other players). These indicators make a good beginning assessment of sustainability for the industry.

Indicator:		Calculation	Average %
Profitability	Investment in new processes and products	% of Revenue	6.0
	Operating Margin	% of Revenue	8.9
	Return on Capital Employed (ROCE)	% of Capital Employed	9.5
	Value Added	% of Revenue	3.2
Environmental Indicators	Greenhouse Gas Emission Produced	Tonnes of CO ₂ / Tonne of Crude Steel	1.6
	Material Efficiency	%	96.8
	Energy Intensity	GJ / Tonne Crude Steel Produced	19.0
	Steel Recycling	% of Crude Steel Produced	42.3
	Environmental Management Systems	% of Total Employees and Contractors Working in Registered Production Facilities	85
Social	Employee Training	Training Days / Employee	6.3
	Lost Time Injury Frequency Rate	Frequency / 1 Million Hours Worked	7.8

Source: International Iron & Steel Institute

RESOURCES

Company websites

- Aditya Birla Group www.adityabirla.com
- Aluminum Co of China www.chalco.com.cn/stock_en/p_StockDisplay.asp
- Angang New Steel www.ansteel.com.cn/english/egsjj.html
- Banpu www.banpu.co.th
- BHP www.bhpbilliton.com
- Boashan Iron and Steel www.baosteel.com/plc/english/indexe.htm
- Bumi Resources www.bumiresources.com
- China Steel www.csc.com.tw/indexe.html
- Chongqing Iron and Steel www.cqgt.cn
- Dongkuk Steel www.dongkuk.co.kr/english
- Essar Steel www.essarsteel.com
- Hindalco www.hindalco.net
- INI Steel www.inisteel.com/eng/index.php
- Inmet www.inmetmining.com
- Jindal Vijayanagar Steel Limited www.jvsl.com
- Jiangxi Copper www.jxcc.com
- Krakatau Steel www.krakatausteel.com
- Maanshan Iron and Steel www.magang.com.cn/eng/aboutus.htm
- Nalco www.nalcoindia.com
- Newmont Indonesia www.newmont.co.id
- Newmont Mining Corp www.newmont.com
- OK Tedi www.oktedi.com
- Orissa Mining www.orissamining.com
- POSCO www.posco.co.kr
- Placer Dome www.placerdome.com
- Rio Tinto www.riotinto.com
- Sheng Yu www.syg.com.tw
- Tung Ho www.ths.com.tw/HomeEg/Index.html
- Vedanta Resources www.vedantaresources.com
- Yanzhou Coal www.yanzhoucoal.com.cn
- Yieh Phui www.yiehphui.com.tw/engTEST.htm
- Yusco www.yusco.com.tw

Examples of sustainability reporting

- BHP www.bhpbilliton.com/bb/sustainableDevelopment/reports.jsp
- China Steel www.csc.com.tw/csc_e/hr.html
- Newmont Mining www.newmont.com/en/social/reporting/index.asp
- OK Tedi www.oktedi.com/odf/links/reports.php
- Placer Dome www.placerdome.com/sustainability.htm
- POSCO www.posco.co.kr/homepage/docs/en/culture/dn/2004_POSCO_SR_EN.pdf
- Rio Tinto www.riotinto.com/library/microsites/SocEnv2004/intro/100_welcome.htm
- Tata Iron and Steel www.tatasteel.com/corporatesustainability
- Vedanta Resources www.vedantaresources.com/uploads/Sustainable%20Development%20Report.pdf

Company public offering reports

- Aluminum Company of China [Hong Kong Stock Exchange](#)
- China Shenhua Energy Company Limited Offering Statement 25 May 2005 [Hong Kong Stock Exchange](#)
- Vedanta Resources www.vedantaresources.com
- Yanzhou Coal www.yanzhoucoal.com.cn/mygsbak/myen/mmain.htm

Useful web-based resources

- Cement Sustainability Initiative www.wbcdcement.org
- Extractive Industries Transparency Initiative www.eitransparency.org
- Global Mining Initiative www.globalmining.com
- Global Reporting Initiative www.globalreporting.org
- IISI Steel University steeluniversity.org
- International Council on Mining and Metals www.icmm.com
- International Finance Corporation www.ifc.org/sustainability
- International Institute of Steel www.iisi.org;
wwwl.worldsteel.org
- United National Environment Program www.uneptie.org/pc/mining
- World Bank www.worldbank.org/mining
- World Business Council for Sustainable Development www.wbcds.ch

Papers & further reading

- Associated Press, 29 June 2005. *"China Announces New Tax on Steel"*
- Battelle Memorial Institute and WBCSD, March 2002. *"Toward a Sustainable Cement Industry"*
- Business World, 11 July 2005. *"The Gold Diggers, Pallavi Roy and Anup Jaipran"*
- Business World, 11 July 2005. Pallavi Roy, *"The Long Last Mile"*
- Cazenove, 7 March 2005. Asian Miner
- China Daily, April 2005. *"Overseas Investors Eye Nation's Coal Sector"*
- China Daily, 27 April 2005. *"Enhancing Mine Safety Top Priority"*
- Citigroup Smith Barney, 21 April and 31 March 2005. Asian Metals & Mining
- Commodities Now On-line 13 May 2005. *"The China Factor: Booming Economy tests World Vital Signs"* (www.commodities-now.com)
- Commodities 9 May 2005. *"Now On-line Economists eye effect of India on Commodities"* (www.commodities-now.com)
- Earthscan and WBCSD, May 2002. *"Breaking New Ground: The Report of the Mining Minerals and Sustainability Development Project"*
- Ethical Corporation, 4 August 2004. *"Corporate Responsibility on cultural change in Asian mining"*
- IISI Credit Suisse First Boston, 31 March 2005. Asian Metals & Mining Digest, *"The Measure of Our Sustainability: Report of the World Steel Industry 2004"*
- Innovest Strategic Value Advisors, Jan 2005. *"Sector Overview, Metals and Mining"*
- Innovest Strategic Value Advisors, March 2003. *"Sector Overview, Steel"*
- WBCSD, July 2003. Jim Walker and Steve Howard, *"Finding the Way Forward: How Could Voluntary Action Move Mining Towards Sustainable Development"*
- KPMG 2003, Commodities Now, September 2003. *"A Survey of Global Mining Trends: Key Findings"*
- Los Angeles Times, 16 August 2005. *"Cost of China's Coal: Miners' Lives"*
- Morley Sustainable Future Funds: Mining and Metals Sector Guidelines
- Asian Mining Congress 2005. Key Note Address, Paul Mitchell, Secretary General, International Council on Mining and Metals. *The Global Perspective and Implication for Mining in Asia*
- Primedia Business Magazines, 1 Jan 2005. *"Mining the Possibilities: Want to Invest in China? Consider Australian Mining Companies"*
- Reuters, 24 March 2005. *"Cambodia wants gold mines to replace land mines"*
- Straits Times, 6 April 2005. *"New Plan to Halt Mine Accidents"*
- Mining, and Steel, 28 March 2005. *"The Dragon's Den — An In-Depth Look at Chinese Metals"*
- Trucost Sector Report Dec 2004. *"Between a Rock and a Hard Place, The Transparency Dilemma in the Metal and Mining Industry: Key Findings"*
- Trucost Briefing, 26 Jan 2005. *"Newmont Mining (NEM): Reclamation, Remediation Provisions, and Environmental Obligations Rise"*
- WBCSD, July 2002. *"The Cement Sustainability Initiative"*
- WBCSD, July 2003. *"Cement: An Overview of Best Practices"*
- WBCSD, July 2005. *"Cement CO2 Protocol: CO2 Accounting and Reporting Standards"*
- World Bank Group, Pollution and Prevention and Abatement Handbook (PPAH) Environmental Guidelines

- World Bank Group Operations Evaluation, July 28, 2003. Evaluation Research: Extractive Industries and Sustainable Development
- WWF, World Wildlife Foundation January 2002. *"To Dig or Not to Dig: A Discussion Paper for WWF"*
- WWF Australia, Jan 2001. Mining Certification Evaluation Project

About the Author

Nancy Frohman has almost 20 years of experience in managerial and executive positions with major financial institutions in New York, Jakarta, and Singapore. With experience in corporate banking, project financing, and debt restructuring, her primary focus had been on managing and mitigating client and bank risk, advising and negotiating with clients on optimal debt structures, and advising on governance, ethical business policies, and institutional requirements for sound profitable businesses. Additionally, Nancy devoted considerable pro-bono time to non-profit governance and strategy formation, corporate/non-profit partnership strategies, and ethical investment practices. Nancy is now combining her strengths and experiences from professional and pro-bono activities into consulting in the areas of corporate social responsibility, sustainability, sustainable and responsible investing, governance, and general business practices for both profit and nonprofit enterprises. Nancy has an MBA in International Finance (with Honors) from the American Graduate School of International Management (Thunderbird) and a BA (cum laude) from Duke University.

Sponsored by the International Finance Corporation (IFC) Sustainable Financial Markets Facility

ASrIA wishes to thank the IFC for its sponsorship of the project and the report ***Taking Stock: Adding Sustainability Variables to Asian Sectoral Analysis***. IFC's support has been provided via its Sustainable Financial Markets Facility (SFMF), a multi-donor technical assistance facility established to promote environmentally and socially responsible business practices in the financial sector in emerging markets. The SFMF is currently funded by IFC and the Governments of the Netherlands, Switzerland, Norway, Italy, Luxembourg and the UK. IFC is the private sector arm of the World Bank Group (www.ifc.org).

Editorial team: These reports were prepared by a multi-disciplinary team of Asia-based researchers. Their work benefited from significant peer review from sector specialists and investment professionals. We wish to thank Claire McLetchie for her contribution to the peer review process. From ASrIA, Carissa Chan Siu Wai managed the layout and design while David St. Maur Sheil coordinated the editorial process with support from Sweeta Motwani and Sophie le Clue. Finally, we wish to express our thanks to the IFC for their sponsorship of ***Taking Stock***.

Disclaimer: In light of the diversity of the Asian region, ASrIA does not guarantee that each sector report is a comprehensive survey of all potential sustainability topics. With the resources available, however, the reports make every effort to focus on key areas of relevance and to deliver data that is accurate and opinions that are objective and balanced.

All these reports are also freely available on the ASrIA website at: www.asria.org/publications

©ASrIA, 2006.

This report can be quoted in part or length for non-commercial purposes with due credit to ASrIA.



ABOUT ASrIA

The Association for Sustainable & Responsible Investment in Asia

www.asria.org

ASrIA is a not for profit, membership association dedicated to promoting corporate responsibility and sustainable investment practice in the Asia Pacific region. ASrIA's members include investment institutions managing over US\$4 trillion in assets, however membership is open to any organisation which has an interest in sustainable investment.

ASrIA has taken a leadership role in promoting sustainable investment in Asia since our founding in 2001. ASrIA has run conferences, seminars and workshops, and published wide-ranging research on SRI issues. ASrIA has also created a very wide network of organizations and individuals interested in the broad range of policy issues and investment strategies which are essential to the implementation of SRI in Asia. ASrIA's website, www.asria.org, is the primary resource for SRI in Asia, attracting over 4,000 page views per day and over 5,000 subscribers to our regular e-bulletin.

ABOUT IFC

The International Financial Corporation (IFC)

www.ifc.org

The International Financial Corporation (IFC) is the private sector arm of the World Bank Group. Its mission is to promote sustainable private sector investment in developing and transition countries, helping to reduce poverty and improve people's lives. IFC finances private sector investments in the developing world, mobilizes capital in the international financial markets, helps clients improve social and environmental sustainability, and provides technical assistance and advice to governments and businesses. From its founding 50 years ago, IFC has committed more than US\$49 billion of its own funds and arranged US\$24 billion in syndications for over 3,000 companies in 140 developing countries.

IFC's financial support to ASrIA for the *Taking Stock* report series is provided via the Corporation's Sustainable Financial Markets Facility (SFMF), a donor-funded technical assistance program focusing on socially and environmentally sustainable business practices in IFC's financial intermediaries and in the emerging market financial sector at large. SFMF in turn benefits from the generous financial support of IFC and the Governments of the Netherlands, Norway, Switzerland, Italy, Luxembourg and the UK.