

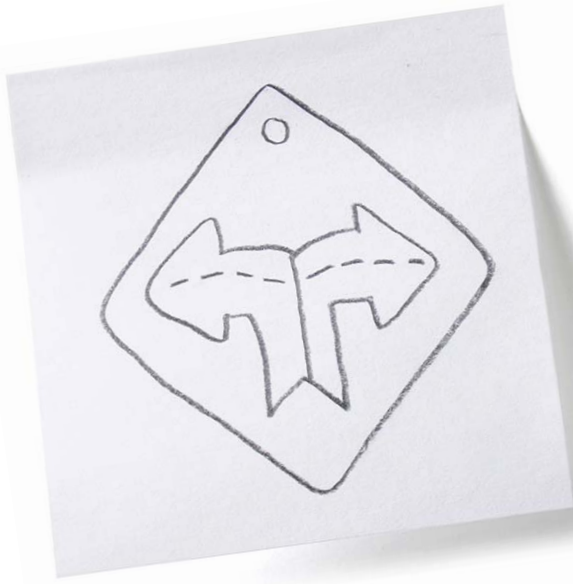


Tracking the trends 2014

The top 10 issues mining companies will face in the coming year

In a climate of volatile commodity prices and shifting demand fundamentals, mining companies are entering a period of structural change. To rectify cost overruns, improve capital efficiency and rebuild investor relationships, companies need to sharpen their focus on productivity, sustainable cost management and enhanced shareholder value.

Phil Hopwood, Global Mining Leader



The gloves are off

Mining companies are no strangers to volatility, but this past year delivered a string of serious blows. As China puts the brakes on its ultra-high growth rates, key commodities such as iron ore and coal threaten to tip into over-supply. Despite weaker commodity prices, costs continue to escalate and many governments are still demanding a growing piece of the pie. As a result, share prices, revenues and profits are falling, and debt levels are rising, with gold miners particularly devastated.

In response to this pummelling, mining companies are re-committing to cost efficiency in more obvious and vocal ways. This is crucial. Unfortunately, it's not enough. Shareholder activism is on the rise. Boards are bringing in new management, with several major companies already seeing CEO transitions. Communities are mounting protests that, in some cases, are resulting in project delays and halts. Regulators are enforcing more stringent legislative compliance. The industry has even been subject to investigations around price fixing.

It's not a pendulum swing, it's a seismic shift

As these changes gain momentum, it's becoming clear that they herald nothing less than a seismic shift. To be fair, this is not the first time the mining industry has faced recalibration. It's just the first time in recent memory, which means few management teams retain the skills to respond effectively. And companies that don't respond appropriately risk not just their profitability, but their long-term survival as well.

Breaking out of traditional responses is neither easy nor intuitive. For decades, the industry has typically waited out market swings, with the assurance that commodity prices would eventually rebound. They will again this time, too. Some industry analysts even anticipate

more robust recovery by the second half of 2014. But which companies, and which management teams, will be knocked out of the ring before we get there?

Radical shifts call for radical change

To assure the viability of your own organization, you may need to make structural changes rather than simply moving around the margins. This involves, among other things, engaging in sustainable cost reduction, relentlessly focusing on productivity and returns on shareholder value, "right-sizing" capital projects, taking advantage of modular construction and embracing new forms of innovation. It requires new approaches for dealing with local communities, governments and regulatory bodies. It may even require a new mindset – one that's open to the possibility that past methods may not yield the most promising future results.

Our 2014 (6th) edition of *Tracking the trends* looks at all these issues and more. In addition to highlighting and organizing key industry indicators by order of current importance, Deloitte's global mining professionals once again share a range of responses companies can adopt to stay ahead of the curve. As ever, we welcome your comments and input and hope this analysis will help drive long-term value for your organization.

There's no doubt the mining industry is experiencing tremendous pressure on costs. But cost constraints often lead to innovation. Mining has grown bigger over the past 200 years – bigger plants, bigger trucks, bigger blasts. But the industry itself hasn't evolved much. Now is the time to make fundamental and dramatic changes.

Glenn Ives, Americas Mining Leader

1 The cost of contraction

Mining productivity hits new lows

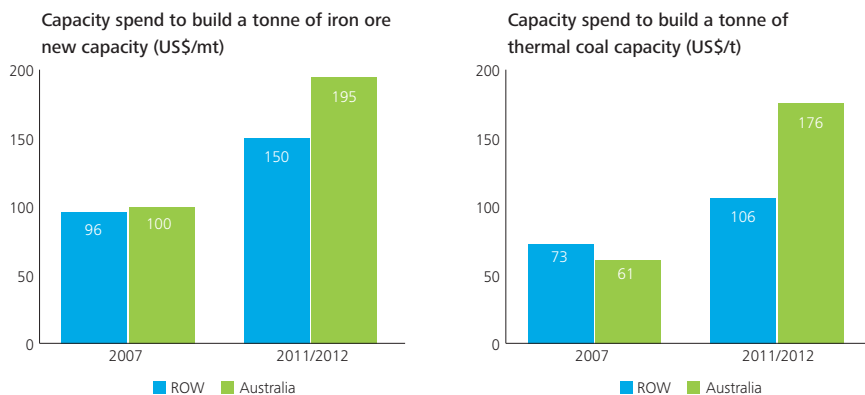
Although the mounting cost of doing business tops our list of trends for the third year in a row, it is only in recent months that companies have cracked down on runaway costs. It's easy to point to the reasons for this sudden diligence: despite commodity price weakness, input and production costs – everything from labour and energy to equipment and supplies – remain stubbornly high.

In Australia, for instance (see Figure 1), the cost to build new iron ore capacity rose from \$100 per tonne in 2007 to \$195 per tonne in 2012. Thermal coal miners were hit even harder, with per tonne costs rising from \$61 in 2007 to \$176 in 2012 – despite the fact that metallurgical coal prices dropped from \$330 per tonne in 2011 to \$150 per tonne in September 2013, while thermal coal commodity prices fell to under \$80 per tonne for the first time since October 2009.¹

Uncovering hidden costs

Mining lower-grade deposits also gives rise to a host of hidden costs. Between 2001 and 2012, the weighted average head grade for copper fell by almost 30%.² Nickel, zinc and gold grades also plummeted. Some gold projects yield less than one gram per tonne.³ With 75% of new base metal discoveries hidden at depths in excess of 300 metres, this practice is pushing up strip ratios – reducing the economic sustainability of mining lower grades. As mining companies work to rectify their cost imbalances, many will need to refocus on return on capital employed (ROCE) by making a business case for producing fewer ounces or tonnes at higher grades.

Figure 1: Spend required to build new commodity capacity



Source: AME, Brooke Hunt, Port Jackson Partners, JP Morgan

Selling those business cases will be no easy feat in the current shareholder climate. For the past three years, total returns to shareholders by major diversified miners underperformed other sectors significantly (see Figure 2) – and the performance gap may be widening.

Under the brunt of this cost equation, many mines went from marginal to loss-making, with operations sinking under water. For the 12 months ending May 2013, average mining sector market capitalizations fell 21%.

The dangers of reactive cost cutting

In response to these trends, mining companies have retrained their focus on capital prudence, cost discipline, portfolio simplification and non-core asset divestment in an effort to improve ROI. They are shrinking the talent pool, reducing executive compensation and limiting funding approvals to only the highest quality projects in mining-friendly geographies.

The trouble with reactive cost cutting, however, is that it is rarely sufficient or sustainable. Companies that slash the workforce now may find themselves

scrambling to recruit new teams as the market recovers. Other cost cutting measures – from reducing travel to tightening cash management – tend to creep back up to historical spend rates over time and many companies get caught in a continuous cycle of cost takeout and cost creep.

To bring costs down more sustainably, mining companies must go beyond tweaking their current cost structures. Instead, they must re-evaluate their operating models to ensure they have the management and reporting systems necessary to build a cost management culture.

Reducing costs over the long term requires mining companies to prepare for a hard campaign of changing the way they do work. This, in turn, should spur them to look closely at their culture to determine if that needs changing too.

Andy Clay, Managing Director, Venmyn Deloitte, South Africa

Figure 2: Total returns by sector



Source: Datastream

Strategies that buck the trend

Rather than one-off cost reductions, mining companies must embark on sustainable cost management programs to become – and remain – lowest-quartile-cost producers. Here are some strategies to consider:

Pursue operational excellence

Rapid cost reduction diagnostics can help mining companies identify key cost levers they can pull to improve productivity and optimize return on capital. To ensure the changes “stick,” they must track and monitor costs by adopting appropriate operating models and reporting systems and potentially changing their internal cultures in order to drive continuous improvement.

Improve efficiencies through technology

Beyond automation and remote operations, numerous technologies can help miners keep costs down. With production visibility tools, for instance, companies can get an automated visual of their mining operations from pit to port, enabling management to identify inefficiencies, track productivity levels, streamline processes and re-plan based on actual performance and conditions.

Use analytics to uncover true cost drivers

It is impossible to reduce the costs of safety, maintenance and other cost-intensive programs on a sustainable basis simply by examining component costs. Using analytics, companies can assess the costs of entire processes to uncover the underlying cost base and identify exceptions and outliers. Using technologies that provide continuous, real-time information on the activity and state of equipment, they can also improve decision-making and asset performance by measuring both financial and non-financial indicators that affect overall profitability. Other systems can transport data from a huge range of disparate sources to deliver on-demand reports, enabling miners to improve asset utilization and reliability, minimize downtime, streamline mine planning and optimize fleet resources. By measuring indicators such as energy consumption per ton/km (kWh/t.km) across all the vehicles in a haulage fleet, companies can quickly determine which specific vehicle/operator combinations are most efficient, allowing them to establish appropriate performance expectations for other vehicle/operator combinations. Emerging metrics, such as measuring the mineral content of each shovel load to determine whether or not it is below cut-off grades, also play a critical role in helping miners manage the true costs of mining operations. By combining analytics with the right performance indicators, companies can identify and realize enormous savings.

Rationalize the supply chain

To reduce costs, companies frequently ask suppliers for steep – and often unsustainable – cost concessions. Rather than pushing the service sector to the wall, it makes better sense to build partnerships with those suppliers who have delivered demonstrable value. By sharing demand forecast data, using that data to ensure billing accuracy and properly tracking KPIs, organizations can optimize contractor management, procurement and commercial arrangements across the supply chain.

Go modular

To get capital costs under control, many mining companies are transitioning to quick-start modular plants and projects that can be expanded as industry fundamentals improve.

Right-size capital projects

Beyond putting marginal projects into care and maintenance, companies can more appropriately scale their operations to suit individual projects. Understanding the difference between a project’s value and the price the market sets also can help companies build stronger funding practices.

The new mining mantra

Beyond giving rise to an untenable cost environment, the mining sector's aborted drive to produce at any cost has led to massive inefficiencies. As a result, industry productivity (defined as the GDP value contribution an average worker creates in an hour of work) is hitting new lows.

A report by Port Jackson Partners⁴ commissioned by the Minerals Council of Australia, for instance, found that, since 1990, high resource sector wages and productivity declines have caused Australia to lose its competitive advantage over emerging miners in Africa, Asia and South America. According to the report, Chinese and Indian producers have an estimated 60 - 80% cost advantage in minerals processing compared to their Australian counterparts. Although miners are now working to improve their productivity levels, Australia's mineral sector last generated a productivity increase in 2003. Since then, productivity has fallen by 30%.

Global productivity dips

But productivity challenges are not isolated to Australia. In South Africa, productivity in the mining sector had dropped to 50-year lows in February 2013. Chile's productivity slumped on falling ore grades, energy shortages and industrial disputes. Canada also experienced a sharp decline. In the mid-1980s, Canada's productivity rate across all sectors was 91% of the U.S. rate. That figure has since fallen to 80%.⁵ In the mining and oil and gas sectors in particular, productivity declined 37% over the past decade.

Productivity improvement focal areas

In light of these figures, productivity improvement has become the industry's new mantra. To ensure a sustainable performance gain, companies should focus on four core areas:

- 1. Mine planning.** As the workforce ages, many experienced mine planners are reaching retirement. Unfortunately, placing under-qualified staff into critical mine planning roles can result in operational underperformance. To avoid significant value erosion, mining companies must make an effort not only to retain experienced mine planners but also to attract and train a new generation of talent. The aim is to maintain the skills necessary to create effective mine plans and track daily adherence to production volumes, mining locations and mineral content.
- 2. Budgetary and risk management.** Independent project analysis in Australia shows that approximately 65% of mega-projects in excess of AU\$500 million fail to deliver targeted value.⁶ To improve project outcomes, mining organizations need a clear line of sight on actual expenditures, one that provides insight on costs per unit of production. Engineering, procurement and construction management (EPCM) operators, mine operators and manufacturers also need the ability to share this information throughout the project lifecycle to prevent cost overruns and mitigate risk.
- 3. Strategic workforce planning and training.** During the boom years, the mining industry lost a wealth of cost management talent. Now companies must rebuild that skillset. At the same time, they must foster workplace practices that restrain spending while keeping employees engaged through programs like flexible rosters, training and long-term career development.
- 4. Systems-enabled transformation.** Productivity is about maximizing throughput per unit of time, per unit of quality and per unit of cost. As such, system transformation should begin by addressing core business drivers such as operating time and rate. Approached effectively, it can turn a disjointed reporting framework into a set of streamlined management dashboards that report on actual operational performance – improving both individual accountability and on-site decision-making.

2 Matching supply to demand

Market imbalances wreak commodity price havoc

Given the world's voracious appetite for commodities, mining industry players are familiar with the story of commodity deficits. Both gold and copper supply, for instance, continue to lag long-term forecasted demand in the face of declining ore grades, the lower pace of new mine development and reductions in both capital expenditures and exploration budgets.

Looming surpluses

The story, however, is now changing as the legacy of unconstrained project development threatens to push certain commodities, such as iron ore, thermal coal and aluminium, into oversupply (see Figure 3).

Part of the story remains economic. For instance, many markets with high exposure to international trade are still on a weak growth trajectory, including Brazil, India and most of Europe.

Yet, the most significant tale remains China's ongoing impact on commodity supply and demand.

The China constant

As China ramps up domestic production, international producers face stiffer competition. Government funding of aluminium production, for instance, is already pushing China's aluminium costs down to a level that other producers can't match.

More significantly, higher domestic production of commodities such as gold and coal could ultimately enable China to reduce its out-sized reliance on global imports, at least until such time as the country internalizes the costs of

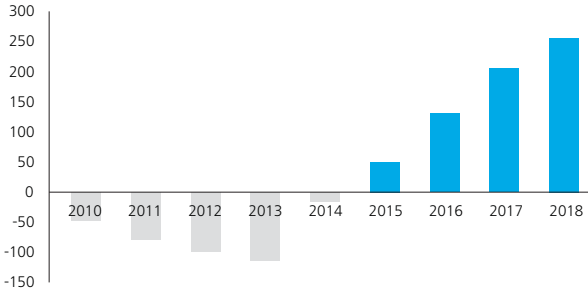
environmental damage caused by its mining activities. This is particularly the case as China transitions away from the investment-driven growth that fueled demand for the commodities used in construction and power generation (e.g., iron ore, coal, natural gas and copper). Notably, this coincides with China's stated intention to put the brakes on its ultra-high growth rates (see Figure 4). Policymakers are guiding the economy toward a more sustainable growth rate based on domestic consumption rather than external forces, which is bound to drive up demand for commodities used in energy production and distribution.

In light of these plans, the U.S. Federal Reserve now estimates that China's economic growth could slow to 6.5% by 2030.⁷

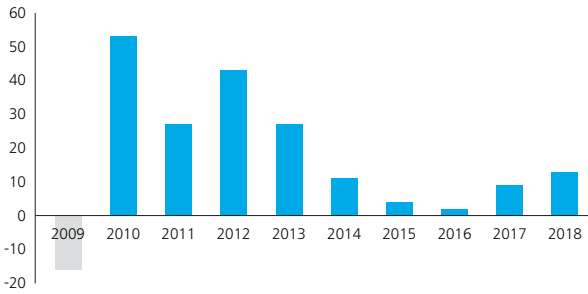
China also recently announced plans to cut coal's portion of its fuel mix from 70% in 2013 to less than 65% by 2017. Should the country be able to execute on this plan while maintaining its pace of growth, added burdens would be placed on a thermal coal industry already facing endemic challenges, such as the shale gas boom in the U.S. and the growing availability of coal substitutes in countries like Indonesia and South Africa.

Figure 3: Commodity market balances

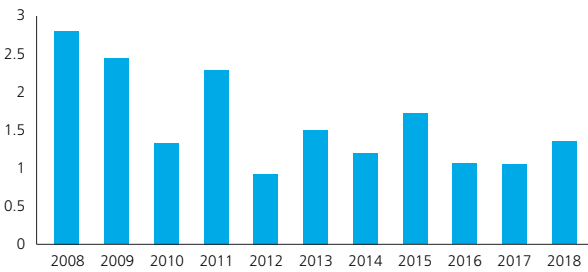
Seaborne iron ore market balance (mt)



Global thermal coal market balance (mt)



Primary aluminium market balance (mt)



Source: Morgan Stanley Metals Playbook Q2 2013

Prices plummet

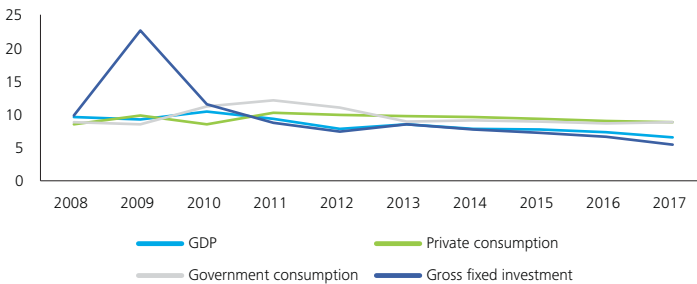
Taken together, these supply and demand dynamics contribute to serious commodity price devaluation. In what is quickly becoming an industry pattern, gold was hit particularly hard, falling from more than \$1,800 per ounce in 2011 to under \$1,200 in June 2013 (see Figure 5), before ticking back up to the \$1,300 range. The drop represented gold's steepest decline in 30 years.

According to consensus forecasts from CIBC World Markets Inc.,⁸ the future projections for commodity prices are no better. By 2016, they predict gold will hover at US\$1,383 per ounce, silver will drop to US\$22.81 per ounce and copper will fall to US\$3.17 per pound. Other commodities – like palladium, platinum, aluminium and nickel – are anticipated to rise, but only marginally.

Beyond exacerbating supply/demand imbalances, the continuing commodity price decline is causing widespread industry performance dips. Marginal mines are struggling to remain viable, stock prices are taking a beating and industry impairment charges are escalating dramatically. In the two years leading to September 2013, industry write-downs rose to more than \$75 billion.⁹

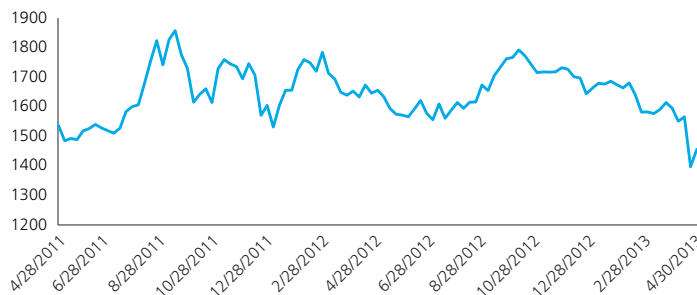
The resulting pullback in exploration budgets only threatens to widen the gulf between demand and supply and could ultimately tip the industry back into another heated production cycle, causing costs to careen even further out of control.

Figure 4: China's path of sustainable growth



Source: Economist Intelligence Unit, May 2013

Figure 5: Gold bullion price trends (US\$/oz)



Source: Datastream

The silver lining

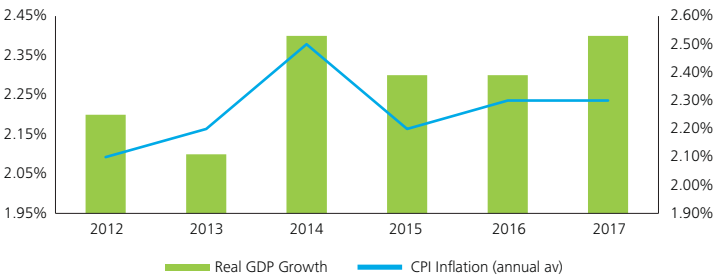
Despite recent weaker performance, of course, there is another side to this story. While the U.S. has not fully recovered from its economic woes, there are signs that it is turning the corner. In addition to falling unemployment rates, GDP growth is forecast to rise into 2014 (see Figure 6) on the back of higher housing prices, increased consumer spending and climbing corporate investment.

For its part, China's relentless urbanization will continue to drive infrastructure spending, advances in technology and sustained positive GDP growth (see Figure 7). This, in turn, will continue to bolster Chinese demand of strategically important commodities such as copper, metallurgical coal, bauxite, potash and gold.

At the same time, the Philippines, Malaysia and other Southeast Asian countries continue to move up the economic growth curve, while India has yet to stretch its muscles.

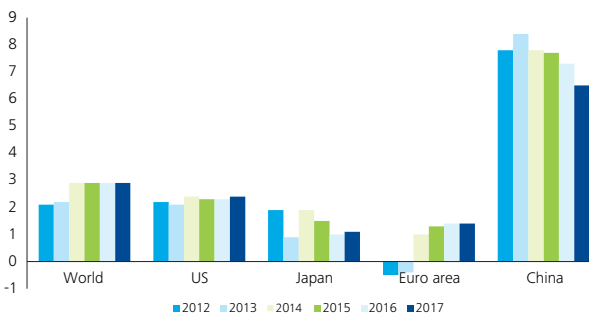
While these positive economic signals do not let the mining industry off the hook for improving its performance, projections and productivity, they do provide a silver lining in a sky currently dominated by black clouds.

Figure 6: US GDP and inflation forecasts



Source: Economist Intelligence Unit, May 2013

Figure 7: Real GDP year-over-year growth forecasts



Source: Economist Intelligence Unit, May 2013

Strategies that buck the trend

While mining companies cannot hope to predict commodity demand or price movements consistently, there are some strategies they can use to manage market volatility:

Get strategic about the portfolio

Traditional portfolio valuation tools largely focus on past valuations. While this provides insight into historical price movements, it often fails to uncover longer-term strategic advantages. This explains why many organizations are exploring strategies for leveraging synergies across their portfolios to ensure they remain robust in various market scenarios. For example, by matching supply to the demand forecasts of particular commodities, miners can make more informed decisions regarding the most advantageous investment opportunities. This can position them to build portfolios geared toward the growth areas of the future.

Link value to price

Many mining companies have strong projects whose value is not reflected in their stock price. An audit review can help companies recognize full asset values on their balance sheets to reconnect value and price.

Integrate

Going forward, some companies may elect to more fully integrate their production and trading operations in order both to generate greater end-value and to better control prices. Although this strategy appears to apply only to large diversified majors, it can also play out at the mid-tier level through strategic joint ventures and consolidation.

Although market demand flagged, long-term fundamentals remain robust. Despite this fact, companies are mothballing projects, capping capacity and choosing not to put production on stream. Taken to its logical conclusion, this behaviour will tip the sector back into a scramble to build at any cost within the next five to ten years. It's time to break this cycle by embracing new ways to do business.

Christopher Lyon, Mining Leader, Chile

A close-up on coal

U.S. coal miners are in the cross-hairs. Aside from weathering a precipitous drop in the price of both thermal and metallurgical coal, coal producers also face steep competition from shale gas and the danger of substitution. In 2012, the sharp fall in U.S. natural gas prices actually displaced U.S. thermal coal volumes in domestic power generation – a displacement that failed to reverse even when natural gas prices rose to \$4/mmBtu in May 2013.

As a result of these trends, U.S. coal producers are aggressively pushing volumes to export markets, contributing to rising surpluses in the global seaborne thermal coal market. Discounted mine-to-port rail transport rates also give the industry added incentive to export into regions that might otherwise be cost-restrictive, such as European markets. Yet those markets, too, may present heightened competition in light of China's announced plans to decrease its reliance on coal for energy. While China sources only 1% of its thermal coal from the U.S.,¹⁰ reduced demand out of China may induce Indonesian and Australian coal producers to focus more on European markets, putting U.S. producers under greater pressure.

A new super-cycle

While some may argue that these factors herald a prolonged phase of oversupply, a new super-cycle may be brewing. On the metallurgical coal front, ongoing urbanization and global economic growth are likely to drive significant increases in crude steel production. And while thermal coal demand flagged in recent months, 75 GW of new coal generation are scheduled to come on line in 2013 alone, rising to 450 GW within the next five years.¹¹

Germany's plan to add 4 GW in 2013 represents its largest increase in 20 years. Japan's decision to move from nuclear back into coal should see it bring on an additional 3.6 GW, as well. Most significantly, India's thermal coal imports are up 25%. In 2012-2013, India produced 558 million tonnes of coal but still had to import 140 million tonnes to meet its total demand. For the current year, that shortfall is expected to rise to 155 million tonnes.¹²

Short-term gain, long-term pain?

This all bodes well for the U.S. coal industry, at least in the short term. The question is: how long will it last? Within the next decade, China will likely produce sufficient volumes to meet domestic demand, particularly if reliance on coal dips in light of ongoing environmental pressure. Similarly, both the public and regulatory push to reduce greenhouse gas emissions (even if less aggressive in recent years), along with continued expansion of the shale gas industry, will see oversupplies building up again in coming years. Although the thermal coal industry does not seem in danger of imminent collapse, shifting fundamentals do call for the development and execution of new long-term strategies.

3 Remaking mining

Exploring the innovation imperative

The business of mining is not getting easier. As grades decline and ore bodies are depleted, companies continue to move into increasingly remote locations with correspondingly harsh conditions, pushing costs to unsustainable levels.

A microcosm of this trend can be seen in the industry's use of energy, which can represent 40% - 60% of a mine's operating costs.

Same old thinking delivers same old results

Typically, miners demand access to a constant source of energy to meet their production needs. This makes the adoption of renewables tricky, given their intermittency. To compensate, companies invest in different forms of storage capacity and work to build portfolios of various renewable and traditional energy sources.

Despite this approach, the fundamental thinking that underpins the energy mix remains the same. In a nutshell, supply is expected to follow demand. And therein lies the rub. As long as mining companies use this equation, they need constant access to a complex mix of energy sources that are not always available or cost-efficient.

Considering how a typical mine operates, this approach seems misaligned. Research of numerous operating mines demonstrates that production is virtually never continuous. In some cases, trucks remain idle up to 50% of the time. Yet, because miners approach operations from a modular perspective – with functions like energy management, site design and fuel procurement working in silos – they aren't equipped to take this operating intermittency into account when scheduling production.

A fresh perspective

As energy costs rise, the issue is aggravated. In Chile, for instance, electricity costs rose 11% per year between 2000 and 2013.¹³ Until recently, commodity prices offset these higher energy costs. However, with prices in the doldrums, this is no longer the case. As a result, mining companies can no longer confine themselves to making incremental component-based performance improvements. Instead, they need to take a broader view of innovation and question underlying systemic decisions.

From an energy perspective, this means taking a more integrated approach to mine design and planning. The aim is to synchronize energy supply and demand from the outset. Companies should look at ways to automate mine processes at the design phase to reduce reliance on fossil fuels. They must also gain a full understanding of local renewable energy capacity – from geothermal and hydroelectric to solar and wind.

In addition to delivering cost savings, this approach can help companies reduce diesel truck carbon emissions, minimize the supply chain challenges associated with getting fossil fuels to remote sites and use automation to reduce labour costs and enhance on-site safety.

The innovation imperative

All that said, innovation is not just about realizing energy savings. It's about challenging existing ways of thinking by revisiting long-standing practices and processes. For instance, using tunnel boring as an alternative to conventional underground drilling and blasting, AngloGold Ashanti envisioned a way to mine as little waste material and as much metal as possible. Other companies are rethinking how to move ore around an open pit using hybrid technologies, such as Rail-Veyor, which have the benefits of conveyors without most of their disadvantages.

Yet the biggest benefits of many possible innovations will not be achieved if companies simply layer new technologies over existing operating models. To realize their full value, current models may require system and operational redesign. This will present both challenges and risks, but failure to innovate will result in greater risk over time – not only as costs escalate, but as more remote mining heightens safety risks.



Tweaking existing processes cannot deliver the massive shifts mining companies need in today's capital-constrained environment. To build true competitive advantage, companies must look beyond incremental performance improvement to determine how they can revise their systems to embrace the broad theme of innovation.

Jürgen Beier, Mining Leader, Canada

Strategies that buck the trend

Although not comprehensive, the following list sets out a series of compelling – and viable – innovation strategies:

Rethink energy management

Consider: while renewable energy sources are intermittent in the aggregate, they offer predictable output in certain countries at certain times of the day or year. Chile and Australia, for instance, can produce roughly eight hours of highly predictable solar energy each day. By understanding the real-time local availability of alternative energy, companies can optimize their systems to operate during times of greatest energy availability, ultimately accessing reliable sources of renewable energy in real time, without resorting to storage.

Electrify processes

Beyond renewables, miners should use electricity more strategically. For instance, using conveyors and similar electric technologies, rather than trucks, to move ore can reduce a company's energy requirement by more than 80%. Given the proportional cost of energy for most mine operations, this saving alone could reduce overall operational costs by at least 10%.

Automate

As Rio Tinto has demonstrated in Western Australia, driverless trucks are already changing the cost equation in the mining industry. However, they are not the only examples of automated technologies that have reached viability. Companies engaging in altitude mining, for instance, also have innovative options. Simple gravity is now being harnessed to move ore and waste down a mountain (at no energy cost) while at the same time generating electricity to power other processes.

Borrow best practices

Adopting an innovation mindset and implementing a process to leverage it allows for new approaches to a wide range of traditional processes. For instance, miners have long relied on costly and sometimes inefficient surveys and drilling to unearth new mineral deposits. However, by borrowing techniques like simulation, technical modeling and 3D and 4D seismology from the oil and gas industry, miners can identify mineral-rich deposits more economically. Leading companies already use techniques like remote sensing to localize ore deposits, which can alter the industry's ability to find deeper, more fragmented deposits.

Build shared infrastructure

Mining companies face input challenges beyond energy availability. Water, for instance, threatens to become scarcer in numerous regions; yet, despite this trend, many organizations continue to compete for the same scarce resources. To access local water sources, many companies build their own pipelines. By collaborating to achieve economies of scale (e.g. by building shared pipelines, water plants, power plants, etc.), companies can reduce costs while strengthening community relations in the process.

4 Finding funding

Debt up, deals down and juniors fight for survival

In the face of falling commodity prices, the M&A storm that was supposed to have followed Glencore Xstrata's historic merger did not pan out. Instead, mining stocks have been punished brutally as traditional sources of financing dry up.

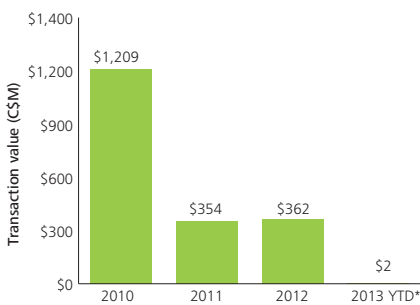
Equity financing falters

The dismal shareholder returns of recent years pushed mining companies out of favour among investors – the same investors, notably who demanded rapid growth in recent years, which may have contributed to companies overpaying for assets. With internal rates of return no longer sustainable, the industry has recorded a record number of write-offs and impairments. As a result, equity markets have shut off the tap. For the first time in a decade, the Toronto Stock Exchange saw no mining IPOs for the first quarter of 2013¹⁴ (see Figure 8) while financing on the Australian Securities Exchange also dropped precipitously (see Figure 9).

Although impairment charges do not translate into defaults, traditional lenders are pulling back from the mining sector. While bank financing is still available, falling market capitalizations prevent companies from qualifying for the amount of funds they need to fuel growth. The same trend may cause companies with high debt ratios to struggle to repay existing loans.

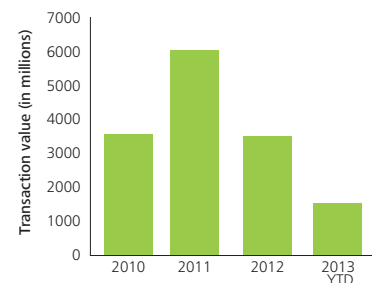
With these sources of funding closed, the large diversified mining companies are turning to the debt markets (see Figure 10). In 2012, miners raised US\$113 billion by selling new bonds, up from roughly US\$80 billion in 2011.

Figure 8: TSX mining IPOs



Note: Based on announced and closed deals as of October 30, 2013.
Source: S&P Capital IQ Transaction Screening Report

Figure 9: ASX public financing (in millions)



Note: Based on announced and closed deals as of Sept. 6, 2013
Source: Bloomberg, Deloitte

Juniors in jeopardy

This option, however, is not as readily available to junior miners, many of whom are struggling to survive. In many cases, financing has proved elusive even for strong projects. As a result, some juniors now have less than six months' run time – a situation that may fuel acquisitions or result in corporate failure. Widespread financial crisis at the junior level could also cause a rash of unintended consequences, potentially driving shortfalls in commodities that majors no longer produce. For instance, interruptions in the supply of molybdenum could lead to shortages in the radioisotopes used in nuclear medical imaging tests. Similarly, a drop in ferrochrome production, which took place earlier in the year when South African producers shut down in an attempt to save on electricity costs, could limit the availability of stainless steel.

The scarcity of capital has caused production to stutter. Even large companies are mothballing operations, scaling back capital expenditures and trying to divest non-core assets. According to Bloomberg, as of May 2013 roughly US\$48 billion of mines and assets were on the block, more than double

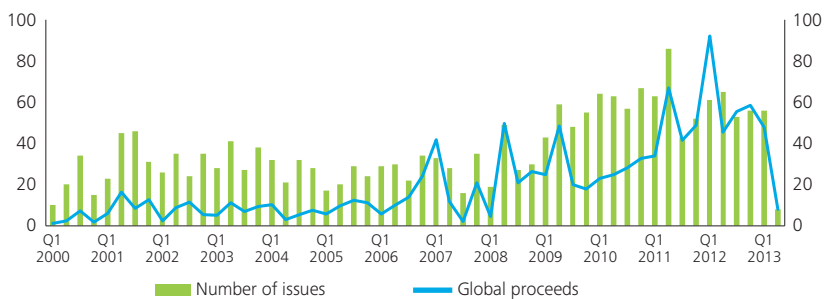
the US\$23 billion of the previous year.¹⁵

Admittedly, the volume of assets for sale is shrinking as companies fail to get the prices they are asking for.

This situation calls attention to the widening gap that exists in terms of pricing expectations. Without ready buyers in the market, M&A activity is flagging (see Figure 11). According to Thomson Reuters, the value of announced deals in the metals and mining sector as of September 2013 fell to US\$64 billion, roughly half the value of deals announced as of one year previous. Taking the Glencore Xstrata transaction out of the mix, deal value for 2013 fell more than a third, to US\$50 billion.¹⁶

Chinese investors, who might otherwise have stepped into this gap, have slowed their activity as well. While China still believes in owning more supply, it is currently struggling to cope with past deal flow and internal issues. As a result, Chinese investors are likely to confine their near-term activity to the auctions of larger, later stage assets, with small groups of well-qualified buyers picking up only those projects that fit their strategic focus.

Figure 10: Corporate debt issues in global metals & mining since Q1 2000



Source: Thomson Financial

Buyer's market

Companies with a counter-cyclical mindset may benefit by approaching this market turbulence as a buying opportunity. Non-traditional investors such as private equity firms have already completed mining deals, while others are nosing around the market in an effort to uncover enduring value. This raises questions regarding the industry's longer-term ownership structure: will private equity assume a greater percentage ownership? Will competition for assets heat up as a result?

Similarly, while investment from China is down, it's not out. As Chinese groups become more willing to consider alternative structures and regulators attempt to learn from past mistakes, deals with China may get easier.

In this climate, smaller-scale M&A transaction activity seems to be centring in particular markets, such as Canada, Mexico, Brazil and Africa. In an interesting role reversal, Canadian banks are identifying mid-tier mining companies not as targets for the majors but potential acquirers of the majors' assets.¹⁷

Companies with large cash holdings may want to heed these signs. Cash rich companies may benefit by picking up juniors, many of whom will need white knights or lifelines simply to survive. Service companies may also represent valuable targets, especially for companies interested in pursuing greater integration.

Mining companies are hesitant to engage in transactions due to the uncertainty around the forward curve of commodity prices. Shareholder and board scrutiny is also discouraging acquisition. I suspect the M&A market will remain sluggish until there is greater clarity around future demand. That said, the industry is going through one of those cycles that will drive people, in hindsight, to say that this was a good buying opportunity. Companies that take advantage of this opportunity by going up the risk curve may find themselves rewarded over time.

Jeremy South, Global M&A Mining Leader, China

Figure 11: Global completed metals & mining deals



Source: Thomson Financial

Strategies that buck the trend

In an effort to keep their heads above water, junior mining companies are seeking new sources of funding. Some options include:

Sovereign wealth funds

Although China dominates this market, other countries are entering the game. Indian investment houses are buying Australian coal to secure assets and supply for both electricity and steel. Both Japanese and Korean investors are becoming more active in the sector. The Middle East also represents a significant source of potential wealth. Although these investors have not yet committed, funding from countries like Qatar, Abu Dhabi and Saudi Arabia may not be far off.

Private equity

According to Preqin, a firm that studies private equity, eight mining funds raised US\$8.5 billion in 2012 alone.¹⁸ Although private equity firms typically shy away from the mining industry, interest may mount as valuations fall and competition from larger mining companies eases. That said, many analysts still believe the sector is too big – and timelines too long – to sustain private equity interest.

Non-traditional stock markets

As liquidity through traditional stock exchanges becomes scarcer, some miners are listing on non-traditional exchanges in Asia (including Singapore), the U.S. and Europe. Hong Kong's stock market remains open to miners with solid business cases.

Alternative financing

While major companies tap the bond markets with a range of high-yield and hybrid issues, others are seeking different sources of funding through royalty and streaming arrangements, off-take deals, joint ventures and equipment financing. Some Russian miners have had success tapping into the Eurobond market.

Pension funds

Pension funds typically have a long-term liability profile, which aligns nicely with the mining industry's long-term assets and returns. The sector could see more interest from this quarter as pensions look to mining assets as a potential hedge against inflation. According to Preqin, public sector pension funds accounted for 18% of organizations with an interest in natural resource private equity in 2012, followed by endowment plans at 17% and private sector pension funds at 11%.¹⁹

Consolidation

By pooling their capital and resources, some companies may be able to lower their labour and equipment costs sufficiently to ride out current market turbulence. Although transactions are down, companies that can present buyers with a strong rationale for their asset pricing are more likely to attract investor interest. To position for these opportunities, companies must right-size their portfolios and ensure that key assets are capable of functioning as standalone entities, both from a financial and functional perspective. They also need to better calibrate their balance sheets in preparation not only for sale but also potential refinancing.

5

The project pipeline stutters

Record impairments call capital allocation practices into question

If the past year made anything clear, it is that mining companies have a lot to answer for. In their relentless pursuit of growth in response to pressure from investors and analysts, companies developed massive project pipelines. Some also developed marginal mines, hoping commodity prices would buoy poor project economics.

Unfortunately, market forces did not comply, resulting in a rash of asset impairments. As of September 2013, industry impairment charges topped an astonishing \$75 billion in just two years.²⁰ As companies shift focus from production at any cost to producing more cost-effectively, they are placing both marginal operations and large capital- and risk-intensive projects into care and maintenance. Several major projects have been postponed indefinitely or cancelled entirely. Others are slowing the pace of project expansion until economic headwinds subside.

Selective investing

On the flip side, there seems to be a tacit understanding that growth cannot halt entirely. Major companies have announced their intentions to continue investing in projects, but they are doing so more selectively and in a way that will meet investor return expectations.

As accessible ore bodies are mined out, however, miners have been forced to turn to more remote destinations and deeper deposits. This pushes up the cost and complexity of capital projects and results too often in investments that fail to yield expected returns.

To turn the capital project tide, mining companies need more robust project scoping processes, governance systems and risk and control mechanisms. They also need to hone their project management performance in areas that frequently lag, such as project scheduling, contractor readiness and project tracking. Until miners improve core competence in these areas, they are bound to face rising investor discontent, capital scarcity and stock market underperformance.

As marginal projects sink underwater, it is becoming clear that the fervour, enthusiasm and intense drama surrounding capital project expansion was purely an effort by mining companies to meet investment community expectations. Now that low commodity prices and high production costs are the norm, it is time to optimize mine plans and close uneconomic developments. This begins from the bottom up. If a company's ore bodies do not have the capacity to offset related capital expenditures, these projects should simply never be mined.

Russell Banham, Energy & Resources Leader, CIS

Impaired decision-making

The quick decline of marginal projects into unsustainable ones raises the question of how well mining companies set project assumptions, review capital project feasibility studies and manage the investment appraisal process. With renewed focus on capital efficiency, it may be time to add more rigour to these activities.

Improving capital allocation

Leading companies understand this imperative, conducting reviews of all major capital projects as part of the approval process and even bringing in external mining engineers to provide risk assurance around mine planning. In the recent super-charged commodity environment, however, some of these practices fell by the wayside.

This is particularly dangerous in an environment of tightening margins, sharper investor expectations, cost volatility, capital scarcity and heightened regulatory scrutiny. As companies grapple with the uncertainties presented by exceptionally long project lives, they need processes capable of supporting the most intelligent capital allocation decisions. For many, this also means building greater confidence in, and deriving it from, their forward-looking numbers.

Multi-variable risk modeling

Forecasts and plans are often created by aggregating “best guesses” from across the enterprise without focusing intently on the risks that can cause performance variance. While companies conduct sensitivity analyses and build buffers into their estimates to mitigate downside risks, these tactics generally do not reflect the complexity of today’s global business environment.

To prevent blunders, companies must incorporate multi-variable risk modeling into their forecasting and planning processes. The aim is to generate a range of possible outcomes and associated probabilities based on a multitude of risk variables rather than basing financial forecasts on single-point estimates. Cash flow and earnings-at-risk measures are produced by “shocking” financial forecasts against major risk drivers to generate a probability distribution for each period.

The risk-adjusted output this can deliver provides greater insight into the correlation of multiple risk factors calibrated to each region where mining companies operate. This enables companies to make more informed investment decisions and create mitigation strategies that address specific risks that could otherwise throw financial projections into disarray.

Strategies that buck the trend

In an industry where projects span decades, it can seem impossible to make accurate capital allocation decisions. New approaches and new technology capabilities, however, now provide mining companies with the ability both to identify and to mitigate a broader range of risk factors. Some strategies for improving capital project outcomes include:

Business case review

As business conditions shift, leading mining companies have begun to work with external technical teams to review the soundness and probabilistic risk of their project business cases. Regardless of the stage during the project development lifecycle at which these reviews take place, they can help companies realize better returns by reengineering technical and financial plans, strengthening project design and giving mine planners the flexibility to make large-scale adjustments in response to market trends.

Mine portfolio optimization

Given the link between a company's ore bodies and its profitability, miners must take more time to assign accurate values to their geology. By benchmarking each mine's relative performance, companies can begin to determine which mines have the capacity to generate the economic output necessary to support related labour, operations and capital expenditures. This equips them to prioritize investments so that funds are directed only to those projects that promise optimal returns. For their part, projects running at unsustainable grades or that cannot yield the necessary results must be sold or shut down.

Project rationalization

When structuring their project portfolios, mining companies typically report on consolidated operational expenses and measure shareholder value on the return of their entire portfolio. To avoid over-investing in non-returning projects, however, companies must get more granular in their understanding of each mine's capital intensity, identifying the shareholder value returned from each and driving more informed capital expenditure decision-making in turn.

Predictive project analytics

By comparing project characteristics across multiple business areas to hundreds of completed projects, predictive project analytics (PPA) fosters proactive and holistic risk management that can improve capital efficiency and objectivity, leading to increased chances of a given project's success.

Phased modular construction

One way to conserve capital is to build mines in phases, gearing initial plants to generate smaller volumes when commodity prices are low and then scaling up as demand fundamentals shift.

Talent management

In readjusting their cost bases, mining companies are shifting from asset expansion to operational excellence, the better to maximize cash flow from existing assets. This may require a management skillset that not all companies in recent years have honed, mandating a reinvestment in new talent development.

6

Power to the people

Local community demands intensify

Owing to their potential for both outsized economic contributions and significant local environmental effects, mining companies are in the spotlight – as cast not only by international media but also by a growing number of monitoring and standard setting bodies. Social media has elevated these activities to new levels, enabling the instantaneous and global dissemination of negative press in real time. As a result, corporate reputations, access rights to new discoveries and market valuations are all at risk like never before.

Local content requirements

In response to this wider visibility, many mining companies are raising the bar on what it means to be model corporate citizens. Winning a social licence to operate now means more than simply following national and industry regulations; in many emerging markets, local community engagement has come to the fore as one of the most pressing issues facing operators, with particular emphasis on water and land access rights, environmental protection, local economic development and jobs.

In response, many governments are demanding and enforcing higher local content targets. South Africa is a case in point. As part of the country's Black Economic Empowerment Policy and the Mineral and Petroleum Resources Act (2002), the country imposed local content requirements for all new applications for mineral rights. By 2014, rights holders will be expected to use local suppliers to procure 40% of their capital goods, 30% of their services and a full 50% of their consumable goods. Other countries have also adopted local content mandates.

Industry backlash

As requirements for local content spread throughout the globe, governments and local communities are also growing more sophisticated in their understanding of the value of short-term (majority local) construction jobs created during the development phase of a new project versus longer-term (majority expat) production and supplier jobs prevalent during the operations phase. Once a mine is built and local jobs dissipate, communities are often left with the impression that miners have simply degraded the environment without contributing a sustainable local benefit – a perception that can lead to potential community unrest and expensive operational shut-downs as the social licence to operate comes under threat.

Many mining companies – assuming that the royalties they pay to, and the productive relationships they enjoy with, the national government reflect the benefits enjoyed by local communities – are blindsided by this unexpected reaction at the mine gates. However, in many emerging markets, there is little relationship between national politics and regional realities, especially when a tribal or ethnic divide separates the local populace from those in power in the capital city.

In northern Greece, for instance, attempts to expand local gold mines have been met with community protests, general strikes and an increasingly politicized environment. In March 2013, almost 15,000 people marched through Thessaloniki to protest against both local mine development and the country's more general national austerity measures. Ensuing protests ultimately drove one major gold company to halt its operations until at least 2016.²¹ In Peru, violent protests and blockades led

to the suspension of a US\$5 billion gold and copper project, which locals feared would pollute water supplies.²² This is just the latest violence sparked by natural resource clashes in Peru, which resulted in 19 deaths in only 15 months.²³

Similar mining-related protests have also led to violence in numerous other regions as well, from Guatemala, Colombia, Ecuador and Bolivia to Sweden, Romania and Tibet.

Improving community relations

While it may not be possible to eliminate community protests, mining companies may be able to forestall more serious clashes by taking a more proactive and strategic approach to stakeholder relations. To create win-win platforms, companies need to map their stakeholder and constituent relationships extensively to understand their positions. By establishing a community advisory board and developing a prioritized stakeholder management plan, for instance, companies can better identify the wide range of local and national groups able to impact their operations and work to align project imperatives with community interests.

Such an approach can position companies to gain a local base of economic and political support for their projects, ultimately enabling them to bring projects on line more quickly, lower government penalties, reduce costs and mitigate political and sovereign risk. The key is for companies to demonstrate the contributions their longer-term resource development strategies can make to help grow the local job base, the industrial base and the education sector. This will allow companies to differentiate themselves as partners and move beyond zero-sum discussions regarding local and national content rules.

Recent years have made clear that many stakeholder communities are considerably more sophisticated than they first appear. Many community groups have behind-the-scenes backing, which injects a political element into negotiations that may have been lacking in the past. Companies that do not make the effort to uncover the real drivers of stakeholder demands do so at their peril.

Tim Biggs, Metals and Mining Leader, UK

Strategies that buck the trend

As local communities become more sophisticated in their negotiations with mining companies, the industry must adopt more nuanced responses. Some strategies include:

Developing local supply bases

To build sustainable local content platforms, companies must do more than attract local production workers. They should also integrate other local vendors into the supply chain, turning to them for items like food, services and manufactured goods. By helping contractors meet company requirements, miners not only reduce supply chain costs but strengthen local business skills on a long-term basis.

Improving communications

Miners have been characterized as chronic introverts, which makes them hesitant to share good news. Communicating key messages, however, can go a long way toward assuaging community concerns. Complying with voluntary disclosure programs such as the Extractives Industry Transparency Initiative (EITI) is one way to enumerate the positive impacts companies make on local communities and the environment. Others include reporting on the amount of taxes paid, the jobs created, the social welfare programs financed, the schools built and the environmental programs adopted.

Sourcing local labour

To build sustainable skillsets within host countries, mining companies should develop customized training and capacity-building programs to enhance workers' long-term capabilities. Increasingly, this goes beyond hiring local workers during construction: companies are now considering ways to staff senior management teams with local talent and promote technical skills development among local populations. In Canada, for instance, miners in British Columbia collaborated to set up an Aboriginal Mine Training Association to help train local populations to meet critical industry skill gaps.



7

Resource nationalism spreads

Government relations marked by rising hostility

With the mining sector out of favour among some investors, many governments appear to be riding a wave of mounting hostility toward the industry. As in previous years, this is manifesting as resource nationalism, which has begun to emerge even in traditionally mining-friendly regions.

Anti-mining sentiment

In Chile, for instance, the government recently suspended the construction of a planned \$1.4 billion thermoelectric plant, which threatens to cut local miners off from much-needed electricity. According to Chile's Sonami Mining Association, two-thirds of all planned mining investments have subsequently been delayed or are being revised.²⁴

In the Dominican Republic, the government prevented mining companies from shipping product out of the country, citing shipping manifest irregularities. And in September 2013, Papua New Guinea assumed 100% ownership of the controversial Ok Tedi gold and copper mine, in the process removing a 12-year-old immunity deal that had been protecting the mine's former owner from litigation over environmental damage.

Regulatory intervention

In light of these moves, industry uncertainty regarding sovereign state behaviour is rising. In the past year, resource nationalism hit new peaks in Mongolia, Indonesia and Burkina Faso. For their part, Tanzania, Zambia and Zimbabwe all reviewed their mining codes to ensure that the state maximizes its benefits from the natural resources sector.

After years of development expense and legally-binding contracts, companies in countries like Sierra Leone, Ghana and Guinea are being asked to make additional concessions. Venezuela, Bolivia and Argentina have resorted to outright expropriation. Local beneficiation mandates and export restrictions have also been introduced in several regions, including India.

Notably, these actions are not confined to emerging countries. Canada's province of Quebec introduced a new mining royalty regime in May 2013. And while Australia may be softening its stance, tax rates as they currently apply to the industry – if fully remitted – would make the country one of the highest-cost regions in the world.

Miners pull back

In today's environment, this type of government action is backfiring. To prevent cost overruns and mitigate political risk, some companies are pulling out of controversial regions or putting projects on hold – actions that will leave governments without access to the revenues they seek.

In Ecuador, for instance, one company walked away from a \$700 million investment after the government attempted to impose a 70% tax on revenues.²⁵ Within days of the cancellation, Ecuador's government approved a law meant to speed the development of small and medium-sized mining ventures in the country. Yet this appeasement may be too little, too late.

Breaking the stalemate

To mitigate sovereign risks, mining companies must improve government relations, recognizing that key influencers are rarely confined to one level of government or one government ministry. But government cannot be approached in an adversarial stance, either. Instead, companies must attempt to build longer-term partnerships to mutual advantage by clarifying industry complexities for government stakeholders.

For their part, governments interested in attracting mining investment must take steps to foster greater regulatory stability and develop more mature legal regimes. To be fair, some governments have been courting mining industry interests. In the wake of commodity price declines, some countries have offered tax holidays to industry players and introduced incentives to encourage greater investment. The challenge with these more conciliatory approaches, however, is that they are likely to be temporary measures at best. Mining companies that require investment certainty remain cautious.

Given these entrenched positions, a reset of the current dialogue may be in order. Rather than focusing on immediate assets, governments and industry alike would benefit by fostering greater regional economic vitality that empowers industry to partner with government to deliver long-term economic gain.

With ongoing global economic uncertainty, mining remains the biggest game in town for many nations. As a result, tax offices are becoming more sophisticated in their capacity to extract revenue from the industry. This can work only to their disadvantage in the long term. To avoid chasing companies out of their regions, governments must become more sophisticated in the application of their fiscal rules.

Nicki Ivory, Mining Leader, Australia

Strategies that buck the trend

Although mining companies are currently under the gun, the industry has more clout than it tends to exert. To counter the mounting wave of resource nationalism, companies can:

Form policy development lobbies

While government intervention is not confined to emerging nations, mining companies do have a unique opportunity to influence policy development in less mature regulatory regimes. By meeting with government stakeholders, reporting through organizations such as EITI and engaging with supra-national organizations like the World Bank, mining companies can help set the agenda for fair extractive industry policies. Similarly, presenting a united front on issues related to macro-economic regulation, government policy, tax regimes, import parity and labour relations can give miners greater bargaining leverage and perhaps forestall isolated government action aimed at individual mining companies.

Coordinate local infrastructure projects

Although governments have looked to miners to build local infrastructure in the regions where they operate, corporate ability to sustain these projects on their own is waning. Both mining companies and governments can benefit, however, from promoting public-private partnerships and similar collaborative efforts. For instance, by assuming some of the risks of building infrastructure projects, governments may attract more regional mining – offsetting the infrastructure costs and expanding their tax base in the process.

Cluster-based development

Another way companies can strengthen government relations is by becoming partners in economic development to create a broader mining cluster in target geographies. Rather than being confined to specific mines, clusters encompass the upstream supply chain, downstream industries and related facilities. Although mining companies cannot be solely responsible for building out local infrastructure, they can collaborate with other industry players to build shared infrastructure, from ports to power plants. Companies can also work with local governments to leverage mining infrastructure for other economic clusters.

Get citizens on side

Companies serious about training and hiring local labour, using local suppliers and fostering robust economic clusters can win unprecedented community support in the regions where they operate. Absent vocal public opposition, some governments may be prepared to back down from the harsh stance they have assumed toward the mining industry in recent years.

Look at all levels

When negotiating with governments, mining companies must take care to focus their strategies on all government levels – not just the federal jurisdiction. In many countries, the states, provinces and municipalities where mining takes place can have more influence on permits and licences than the federal government.

8 Crackdown on corruption

Zero tolerance regulatory environments complicate compliance

Corruption and fraud are as old as time. Unfortunately for the mining industry, they don't seem to be getting better with time. As corporate awareness of the risk rises and coordination among international enforcement and regulatory bodies improves, the detection of corrupt and fraudulent acts becomes more frequent. Heightened awareness in civic and local community groups of environmental issues also tends to drive increased attention to corruption issues.

This is a particular challenge for mining companies whose interests extend to countries like Russia, Mongolia and China, which do not have long histories of transparency. In fact, according to Transparency International's Corruption Perception Index (CPI), some of the worst national offenders include Venezuela, Zimbabwe, the Democratic Republic of Congo, Kyrgyzstan and Guinea – all of which score below 24 (out of 100) and all of which attract mining investment. These statistics are backed up by World Economic Forum research identifying corruption as the top impediment to business in 22 countries, including Colombia, Mexico, Russia, Kenya and the Philippines.²⁶

Notably, fraudulent practices are not – and never have been – confined to developing markets. In Europe, probes into the alleged manipulation of global oil prices could bring other commodity market pricing practices into scrutiny. In the U.S., the Commodities Futures Trading Commission launched investigations this past summer into several investment banks and metal warehouse owners accused of hoarding metals to drive up prices.

Regulators respond

The proliferation of corruption, both abroad and domestically, is resulting in the emergence of a more stringent regulatory environment. In Canada, new provisions in the Corruption of Foreign Public Officials Act (CFPOA) give Canadian authorities extra-territorial jurisdiction in their enforcement of the Act – bringing it into line with similar global legislation, such as the UK Bribery Act and the U.S. Foreign Corrupt Practices Act (FCPA).

The European Union (EU) also enacted new Accounting and Transparency Directives this year requiring EU companies in the extractive industries to disclose payments made to governments in countries where they operate. With companies required to disclose different types of payments separately and report payments on a project-by-project basis, compliance promises to be complex.

In the U.S., the Securities Exchange Commission (SEC) issued its final implementation rule on conflict minerals in late 2012. Companies are expected to perform a reasonable country of origin inquiry to determine if their end products use recycled or scrap conflict minerals and must report publicly on their findings each year beginning May 31, 2014.

For their part, the Dodd-Frank rules in the U.S. require SEC registrants in extractive industries to disclose payments to foreign governments in excess of US\$100,000. Although the rule was expected to come into force in October 2013, U.S. courts remanded it to the SEC this past summer to be redrafted. Nevertheless, many companies affected by the U.S. rules continue to make preparations for reporting.

Even countries formerly considered to have weaker policies have introduced more stringent anti-corruption measures, including Brazil, China and Indonesia. On the one hand, this has made decision-makers more cautious: fear of engaging in corrupt practices is leading to a measure of paralysis. On the other hand, enforcement is kicking up, with many regulators poised to turn an infracting company into an industry example.

Balancing risk and reward

This heightened regulatory environment is doing more than pushing up the cost of compliance at a time when the industry can least afford it. It may also threaten to tip the balance between the costs and rewards of operating in over-regulated regions, thereby restricting the ability of major diversified miners to invest freely on a global basis.

While mining companies will always need to dig where the resources are, future decisions to expand capital projects or build new mines are bound to take regulatory constraints more carefully into account than they did in the past.



As anti-corruption legislation becomes more stringent on a global basis, mining companies face heightened risks for non-compliance. This extends well past the reputational issues associated with misconduct, exposing companies to steep fines and executives to the risk of personal liability and imprisonment.

Tony Zoghby, Mining Leader, Africa

Strategies that buck the trend

To avoid getting caught in the compliance trap, mining companies must ramp up their anti-corruption monitoring processes, especially in remote regions, through:

Internal controls and policies

Companies that operate in countries where bribery and corruption are prevalent must engage in appropriate employee training targeted both at people who have the greatest exposure to government officials and at those responsible for detecting improper payments. Miners must also enforce a zero-tolerance culture regarding corrupt practices, stressing the potential impact of infraction, including halted operations, stiff penalties and the loss of a social license to operate.

Compliance audits

In addition to reviewing local operations proactively from a corruption perspective to determine how well people comply with company processes, a compliance audit can help companies detect – and close – process gaps. Some companies have refined this further by using analytics to conduct disbursement testing as a way to identify higher-risk transactions.

Risk assessments

By identifying and prioritizing risk areas, companies gain the ability to implement mitigation policies. These could include conducting due diligence reviews of agents or third-party suppliers, adopting approval processes for certain expenditures or even prohibiting certain types of payments. With access to rich data repositories, companies also can identify and monitor any risks posed by third-party relationships or beneficial ownership structures.

System upgrades

Given the overlapping requirements of different international regulations, mining companies should take steps to build a consolidated reporting framework. This can include upgrading systems to support sufficient reporting detail; establishing strong management systems to uncover improper payments or the use of conflict minerals in end products; assessing supply chain risks for each mining region; and determining the impact of making some of this information public.

9 Changing the safety equation

From zero harm to zero fatalities

With “black swan” events – tsunamis, earthquakes, floods – becoming more frequent, the insurance industry has begun revisiting its actuarial models. After all, recent years make clear that a failure to plan for black swans presents a significant threat to industry profitability.

A similar trend may be taking shape in the mining industry when it comes to safety practices. For decades, mining companies have assumed that major incidents, like fatalities, could be reduced by lowering the frequency of minor incidents, like slips and falls. They are discovering, however, that many fatalities cannot be mitigated using standard models.

The cost of harm

Numbers tell the story. Between 1993 and 2011, non-fatal injuries across all industries declined 51%, while fatal injuries fell by only 24%.²⁷ In mining, both serious incidents and fatality numbers remain high, particularly in many of the industry’s developing frontiers. China’s coal mines have an extremely poor safety record, with almost 2,000 fatalities in 2011.²⁸ In 2013 alone, an explosion in a Russian coal mine killed 17, a landslide at a Tibetan mine took the lives of at least 66 miners and more than 60 miners were killed in the Sudan in a gold mine collapse. Mining accidents in Indonesia, the Central African Republic and Afghanistan also resulted in fatalities.²⁹

This remains a serious issue for the industry, especially as easier deposits are mined out. As mining conditions get tougher, the likelihood of workers suffering major harm rises. Beyond

resulting in lost production time, investigative costs, reputational damage and regulatory fines, fatal accidents take a huge toll on employee morale and have dire impacts on families and communities.

Uncovering the causes

This would be disheartening if fatalities and other catastrophic events were truly random. Fortunately, research shows that the majority of severe incidents result from identifiable, measurable and manageable causes.

Although environments that generate frequent low-severity injuries may be at risk for high-severity events as well, this tells only half the story. That’s because certain types of exposures suggest greater potential for serious safety incidents – even within companies that typically do not experience even low-severity injuries. To reduce the frequency of serious events, then, companies must identify the organizational factors, activities and situations most likely to contribute to a major safety incident.

To begin with, companies will need to take a new look at the way they tackle safety risk, including how they collect, assess, interpret and act on their safety data. They also need the political will, workplace engagement and executive buy-in necessary to transition from a culture of zero harm to one of zero fatalities. By combining current safety practices with those designed to reduce fatalities, mining companies should see significant improvements in their safety outcomes .

Strategies that buck the trend

Uncovering the correlations that expose mining companies to serious safety risks requires a more sophisticated approach to safety analytics. To reduce the rate of serious incidents, companies can:

Model high-risk events

To understand the fatality risks prevalent within their organizations, mining companies must revisit safety data amassed over the years. With new risk analysis techniques, they can pinpoint the industry risks, organizational behaviours and internal cultures most likely to lead to severe safety events. The result? Companies are better positioned to identify the shifts where serious injuries are most likely to occur, the employees most at risk and the differentiating factors capable of reducing those risks.

Re-examine workplace practices

In many cases, serious and fatal injuries result from a failure to follow standard safety procedures. To cut down on these incidents, mining companies must identify which procedures are being subverted – and why. As the ultimate owners of risk, workers must be engaged in this process from the outset, helping to identify problems, generating solutions, piloting ideas and implementing change.

Break down data silos

Mining companies already collect a plethora of data following safety incidents. They typically do not, however, correlate this information with other data points available to them (e.g., work rosters, production data, equipment maintenance schedules, weather conditions, vehicle telemetry). By combining standard safety data with non-traditional data sources, companies can infer causal relationships in external safety incidents. As safety incident patterns emerge, companies can identify at-risk segments and activities to minimize the incidence of serious injury. Applying this approach, one major gold company uncovered previously hidden causal relationships between compensation and injuries, injury rates and age, and tenure and job roles. This enabled it to alter internal procedures and processes to reduce serious safety events.

Mining companies often analyze massive amounts of safety data, but frequently end up without significant safety insight or action plans. By examining the organizational factors that contribute to poor safety outcomes, and looking at non-traditional – but easily available – data points, miners can identify the employees at greatest risk of harm and objectively pinpoint the levers that can reduce those risks.

Valerie Chort, National Leader, Corporate Responsibility and Sustainability, Canada

10 A dearth of skills

The talent gap widens into executive suites

Despite project halts and a slower pace of development, the mining industry's talent shortage persists. Accordingly, miners must continue to refine their talent attraction and retention strategies, especially as many senior workers reach retirement age.

In fact, according to Canada's Mining Industry Human Resources Council, approximately 40% of the resource extraction industry's workforce is at least 50 years old, and one third is expected to retire by 2022.³⁰ Even if some of the older workers transition into executive positions, the pace of worker attrition threatens both operational productivity and the leadership pipeline. Similar trends hold in other countries as well.

The retention imperative

Miners with a positive industry prognosis also risk longer-term labour shortages if they fail to retain the talent they spent years nurturing. A massive exodus today threatens to push up costs in the future as companies scramble to rehire lost talent that is already being absorbed into different sectors.

Although companies are looking for ways to bring costs under control now, they must also balance the need to cut costs with the potential for labour unrest that could result from lower pay grades and workforce reductions. In South Africa, for instance, the rise of more militant unions has driven an uptick in wildcat strikes that are disrupting mining operations. Tragically, several labour disputes escalated into open conflict last year, resulting in injuries and deaths.

A changing management mix

In an interesting twist, however, the imperative to retain key talent did not prevent this past year's massive talent shift. CEOs from several major companies were replaced. Senior managers are transitioning into new roles in new regions. Organizations that once maintained a commitment to talent development are undergoing significant layoffs, while executive salaries and bonuses are being cut. Interim management teams are replacing permanent hires. There has also been considerable movement on the boards of mining companies around the world, as companies work to attract directors with operational industry experience.

Amid this turmoil, the industry's long-standing talent gap is extending its reach into senior executive suites. This has left many companies without the skillsets crucial to shepherd them through the current commodity price downswing or ensure success in remote and unstable regions. A similar gap may exist at the board level, where directors often possess extensive corporate governance expertise but lack mining industry background. While this mix may work in strong economic environments, it exposes companies to undue risk in today's weak market. Closing this talent gap will require miners to make more considered decisions in their search for both skilled management and sector-savvy directors.

Strategies that buck the trend

In today's tumultuous economic environment, mining companies are walking a fine line between reducing labour costs and retaining critical talent. This requires a double-pronged approach that focuses both on fiscal management and talent development. Strategies to consider include:

Developing a board-focused talent strategy

While most mining boards of directors possess native expertise in both financial management and corporate governance, some lack the sector-specific operational skillsets that today's turbulent markets demand. To constitute an effective board, mining companies need a talent acquisition and retention strategy focused specifically on closing any gaps in operational expertise.

Standardizing systems

In an effort to reduce costs, some mining companies are implementing common operating systems across all their mine sites. By standardizing systems, staff mobility becomes easier as people can move to different sites without major retraining. Conversely, however, an overly-rigid operating environment can stifle innovation and creativity, resulting in the flight of key talent. Companies must take care to get this balance right.

Embracing new training environments

Around the world, a range of innovative programs are changing the way mines attract and train talent. In Canada, for instance, the Northern Centre for Advanced Technology (NORCAT) runs an operating mine used for training, project demonstration, testing and new product development. Several universities in the country also introduced mining-focused executive education programs designed to attract leaders from other industries into the mining sector. In a unique partnership, one mining company joined with an engineering firm last year to open an innovation centre in India staffed by almost 300 skilled engineers dedicated to helping the company meet its diverse technological needs. This is the kind of innovative thinking and action that will best help the sector address its long-term talent challenges.

Miners continue to struggle with a pronounced, sector-wide skills shortage – one that now extends beyond traditional talent gaps. As we enter what may be a prolonged period of commodity price volatility, the industry needs to develop different leadership skills as well and bring in management capable of improving productivity, controlling costs and maximizing operational returns.

Jenny Bravo, Director, Strategic Clients, U.S.



A new approach to doing business

Embracing innovation in all its forms

In their headlong pursuit of volume, many mining companies abandoned their focus on business fundamentals. They compromised capital allocation decision making in the belief that strong commodity prices would compensate for weak business practices. Rather than maintaining a long-term view of the market, many acted opportunistically. They are now paying the price.

To redeem themselves, companies are adopting more sophisticated portfolio and capital allocation techniques. These, however, may not be sufficient. To turn the current tide of poor productivity and hostile sentiment, companies may need to embrace innovation more aggressively.

For starters, they must alter their approach to cost cutting by adopting more sustainable cost management practices. They must embrace new forms of technology to gain greater insight into their underlying performance metrics – not only from an operational perspective but also pertaining to their health, safety and talent management programs. Engaging in more strategic scenario planning, similarly, will help mitigate the risks of commodity price volatility, regulatory uncertainty and water/energy availability. Finally, they must take more innovative approaches in their dealings with communities, governments, shareholders, regulators and staff – including explaining their strategies to investors and analysts in more direct and compelling ways.

In short, it is time for mining companies to change the way they do business. This will be no easy task for an industry unused to radical change. Yet it's precisely what the market is demanding, despite the same market players promoting investment in major acquisitions and high-growth projects just a few years ago. Ultimately, organizations that succeed into the future will be those that invite external perspectives, use data-driven insight to inform their decisions and abandon the locked-in paradigms to which the industry has adhered in recent years.

While mining companies cannot change global economic trends, they can change the way they operate. As miners work to attract more visionary leaders, the creativity and forward-thinking that characterize innovation and progress will cease to be industry anomalies and become the norm.

Endemic industry issues have not shifted. Mining companies continue to struggle with rising costs, commodity price volatility, funding constraints, talent challenges and resource nationalism. What has changed is the way in which companies must now approach these issues. To set the industry back on a sustainable path, companies must change how they do business by looking at old problems in new ways.

Carl Hughes, Global Head – Energy & Resources

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