
Stop. Think... Act



Mine 2017



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Foreword

Welcome to PwC's 14th annual review of global trends in the mining industry – Mine. This analysis is based on the financial performance and position of the global mining industry as represented by the Top 40 mining companies by market capitalisation.



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Introduction

Recovering from 2015's race to the bottom, the members of the Top 40 paused and drew breath in 2016. Rapidly rising commodities prices promised a way forward and the valuations of the Top 40 responded. But, valuations aside, there is little to suggest that the group made any substantial advances throughout the year.

At first glance, the 2016 financial data seems a little dull. The numbers, however, highlight the symptoms of a broader inertia. We believe the industry is determining its next move. The poor results of 2015 demanded a reaction and short-term price rebounds provided the scaffolding to make the Top 40 great again. However, restraint was the order of the day. A price rise was welcomed but with cautious optimism and warnings to heed the lessons of the past.

The narrative of the Top 40 in 2016, therefore, reads like a mine site safety mantra: **Stop. Think... Act.** The industry has stopped feeling so anxious and is now considering "Where to from here?". Some members of the Top 40 stated their intentions, but 2016 was not a year of action. We now wait to see how the industry will advance.

Stop

In 2016, traditional players continued balance sheet bolstering to calm the market and stop the angst associated with financial distress. A heavy emphasis was placed on shedding debt. The brakes were firmly applied to exploration activities which continued to shrink, and what little was undertaken was generally allocated to "safe" jurisdictions. Capex fell dramatically again, by a further 41 percent, to a new record low of just \$50 billion, and there was a lack of significant greenfield projects announced or commenced.

Production was generally flat. While the Top 40 faced external headwinds in the form of increased oil prices, prudent cost control measures ensured operating expenditure was constrained. Traditional miners were rewarded with a strong upswing in their market cap, and earned some breathing space. Many planned disposals were called off in response to better market conditions.

The exception to this was the 11 Chinese companies within the Top 40. China defied conventional industry behaviour and invested at the bottom of the cycle. Indeed, the most significant asset buyers among the Top 40 were Chinese companies.

Think

Where to next, we ask? Is the strategy so defensive as to simply advocate repaying debt, preserving cash, sustaining existing assets and waiting for a sustained increase in prices?

In the short term, shareholders may appreciate the strengthening of balance sheets and increases in share prices. But the industry will need to execute a longer-term vision or it will remain at the mercy of commodities speculators. Shareholders will demand performance from the existing asset base, culminating in dividends, or they will simply reallocate their capital if the mining sector cannot provide a long-term growth vision.

There is clearly a divergence in thinking between Chinese companies and the rest of the Top 40 as their goals are different and Chinese capital is more patient.

China aside, the old guard have donned hard hats, high viz jackets and steel-capped boots in a bid to protect themselves from the pitfalls of the recent past. Praise should be given for the efforts to repay debt, innovate and adopt new efficiency measures – all of which have helped to curb costs and restore credit ratings and investor trust. But where will this thinking take the industry if a "playing it safe" attitude to investment prevails in the future? We argue that it will lead back to old habits of lavish spending in a boom followed by a wave of write-offs during the bust that inevitably follows.



Stop



Think



Act



New opportunities and hazards are on the horizon. Do we take it seriously when Apple poses the question “Can we one day stop mining the Earth altogether?”¹ or when Elon Musk puts forward a 100-day guarantee to fix a state’s energy crisis with battery technology?² The industry must carefully consider how it responds.

Many in the Top 40 have reflected on the qualitative aspects of their license to operate. The community increasingly demands exceptional corporate social responsibility. In terms of safety standards and broader economic contributions, the industry has long done some heavy lifting. However, the story often fails to resonate with governments and the broader community. Some in the industry are now making bold declarations on matters such as diversity and transparency, but they will need to demonstrate action soon or risk becoming laggards in the broader corporate pack.

While the sirens are not sounding, the warnings are ever-increasing to adapt to these challenges.

Act



Balance sheet clean-ups require discipline and much hard work has been done. We witnessed the tailing-off of impairments, the avoidance of any new bankruptcies, the absence of any significant streaming transactions and the general passing of distress. The market rightly applauded this, reinstating a positive gap between market caps and net book values that was absent in 2015. Healthier price-to-earnings (P/E) multiples returned. And, even as price growth slowed early this year, valuations continued to rise until April. This provides a platform for the industry to act into the future.

What we failed to see was significant action on the future direction of the Top 40, at least by the traditional players. We’ve called the industry out in the past for reacting to short-term price movements, and thankfully this did not happen in 2016. Is the pause an indication of longer-term thinking by the industry? One major (Rio Tinto) may think so. Recognising the long-term, cyclical nature of the industry, it has publicly stated that its new CEO has a “10-year mandate”.³

Already well known is the rising importance of battery technology and its impact on coal and “new world” lithium, cobalt and graphite. Our sole lithium player from last year (Tianqi Lithium Industries) remains in the Top 40, and we know of other integrated companies in these sectors that qualify for inclusion if they were pure-play miners. But the future may be about integration. Emerging market companies, who are also focused on new world minerals, are increasingly integrated. In the traditional markets, we are seeing new players seeking to secure supply and even calls by stakeholders for BHP to get on board the battery train. It remains to be seen if a major will pivot in this direction.

What will be the results of this reflection for the remainder of 2017? Will action come in the form of investment in greenfield projects, M&A or technology? The latter, we think, simply cannot be ignored.

Aside from the completion of new projects, none of the majors has signalled bold intentions for future growth. But who could blame them when early 2017 has heralded further volatility in prices and the subsequent reversal of some of the 2016 gains. Few things are certain in this industry, but we know that China is unwavering in its strategy, shareholder activism is rising, government interventions are becoming more commonplace and new players are disruptive. Will the industry also act, or simply react?

Jock O’Callaghan
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1. <https://www.apple.com/au/environment/>

2. <http://www.afr.com/technology/teslas-elon-musk-pledges-to-fix-sas-power-crisis-in-100-days-or-its-free-20170310-guvf1x>

3. <http://www.afr.com/business/mining/rio-offers-jacques-ten-years-at-the-top-20170503-gvy78c>

Industry in perspective

Miners saw the dust settle at long last in 2016, after a pulverizing downturn ground the industry to a virtual halt. Today, after years of pulling back on investment, exploration and human resources, the world's largest mining companies are ready to move ahead. They have cut debt, strengthened balance sheets and taken necessary impairments. In the process, these players have found themselves in step with an awakening global demand for most commodities, and they have watched their credit ratings rise and valuations grow. This year will be all about assessing options and making the right corporate decisions to sustain the market optimism that these events have unleashed.

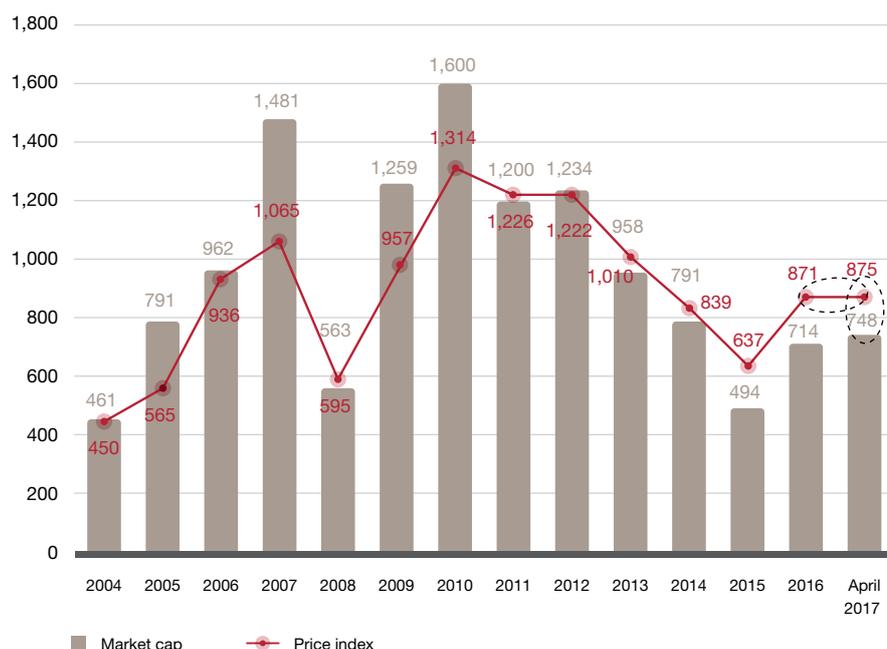
The first quarter of 2016 was a turning point as industry fundamentals started to improve. Through the year, we saw a rise in both spot commodity prices and the market capitalization of the Top 40, two markers which have historically been strongly correlated. Though prices have not yet rebounded to the pre-downturn levels reached in 2011, we do see evidence that they have bottomed out.

While spot commodity prices remain volatile, long-term analyst consensus price forecasts held relatively stable throughout 2016. The key to a sustained recovery will be to ensure that the industry does not repeat the mistakes of the last boom cycle: buying high, pumping up production with marginally profitable and expensive projects, and then recording significant impairments when commodity prices decline.

Mining companies need to impose better capital discipline in the decade ahead and, indeed early evidence suggests that they began to do so in 2016. The industry must also consider the potential gain of bolder moves while costs are still relatively low.

Last year marked the return to profitability of the Top 40, with an aggregate net profit of \$20 billion in 2016 as compared to an aggregate loss of \$28 billion in 2015. Valuations also climbed, especially for the traditional miners, with the trend continuing through Q1 2017 even as commodity prices remained flat. The mining industry remains a long way off the peaks of previous cycles, but it has regrouped and begun to rise again.

Market cap of Top 40 vs adjusted price index (\$ billion)



Source: PwC Analysis
Market capitalization of the Top 40 companies against an adjusted price index for a basket of commodities including copper, coal, nickel, zinc, gold, silver and iron ore.



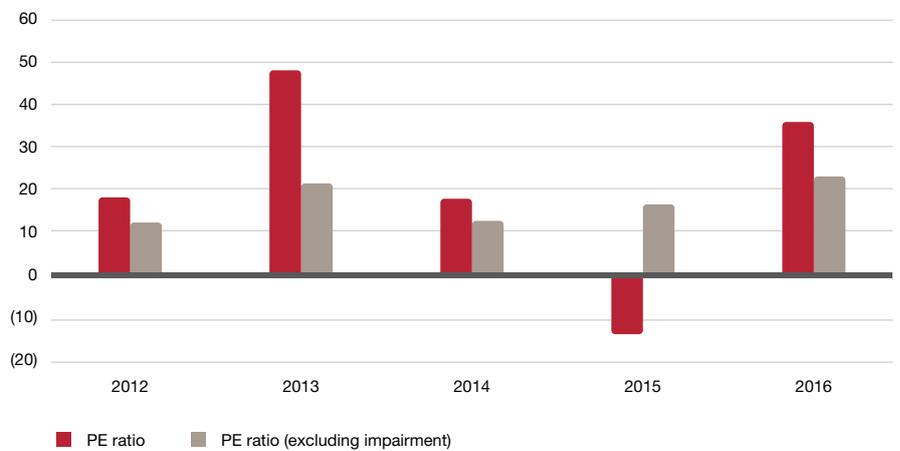
Reclaiming investor confidence

The clearest sign that there is renewed confidence in the sector is the willingness of investors to pay more for the future earnings of mining companies.

P/E ratios are not indicators of future results, but they do reflect the market's view of expected profitability. A higher P/E ratio says investors are willing to pay a greater price for a stock's future earnings and vice versa.

While the Top 40 racked up significant losses in 2015, their earnings excluding impairment charges increased slightly between 2015 and 2016. During the same period, however, investors proved willing to pay more for these companies as global commodity prices improved. As a result, P/E ratios returned to positive territory. And today they are suggesting that we may have witnessed the bottom of the cycle and can expect profits to further climb in 2017.

Top 40 price to earnings ratio



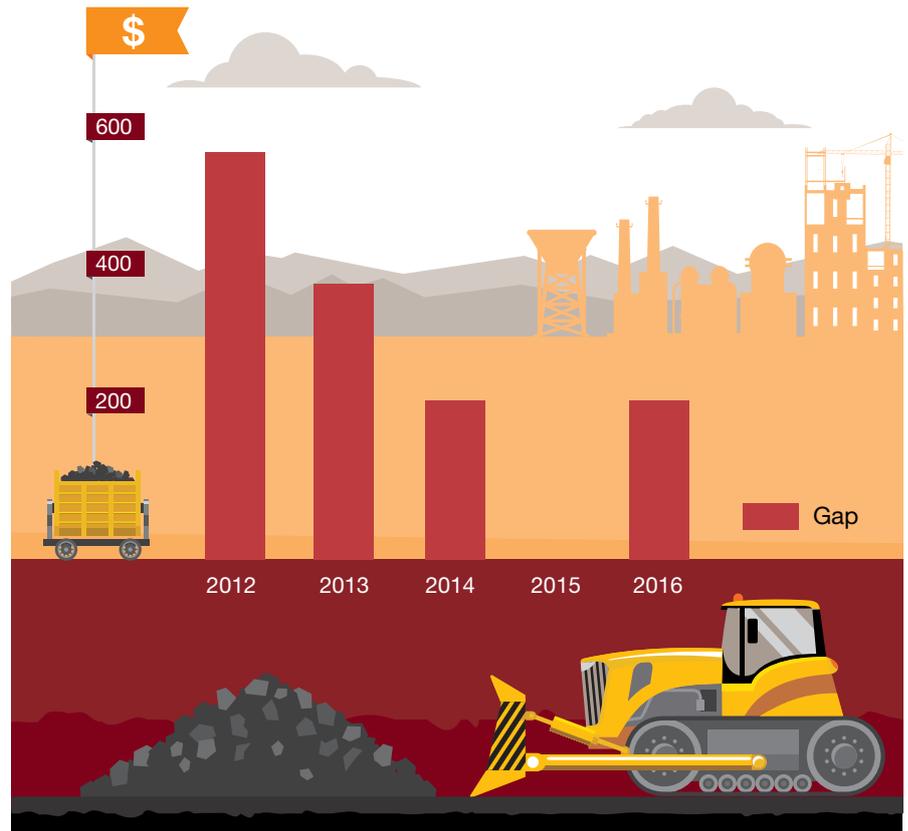
Source: PwC Analysis

Regaining investor trust

As the last commodity downturn took hold in 2012, nothing signified the degradation of trust in the industry more clearly than the shrinking gap between the aggregate net book value and market value. The nadir occurred in 2015, when net assets were collectively almost at par against the market capitalisations of the Top 40. This was the moment when investors essentially concluded that the outlook was so poor for some companies that the businesses were worth less than the carrying value of their assets.

Last year marked a critical turning point as market caps once again exceeded net assets. The positive gap of approximately \$220 billion between the two in 2016 represents the first increase since 2010; it is supported by the \$204 billion of impairments booked in the last five years, including \$53 billion in 2015 alone.

Year wise Gap in Market cap and Net Book value (\$ billion)



Source: PwC Analysis

Movement in Top 40 market capitalization

Overall the market capitalization of the Top 40 increased in 2016 by 45 percent to \$714 billion, approaching the 2014 level. Rising commodity prices played a driving role, but we need to ask, “How big a part?” Have companies been lucky or good?

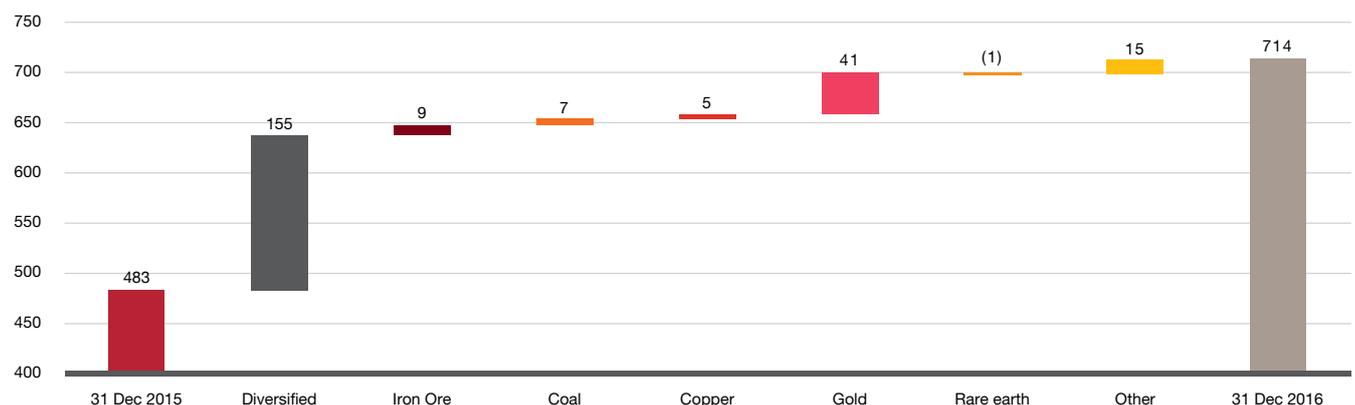
By the end of April 2017, valuations had gained an additional \$34 billion during a period when spot commodity prices were relatively flat.

This data suggest that the market is valuing stronger balance sheets and solid management, suggesting that investor trust is on the rise and the recovery is sustainable.

It is worth noting, however, that the rise in valuations was distorted by spot iron ore prices. Among the traditional companies, four companies represented almost 50 percent of the increase in overall market capitalizations, and each of them has exposure to iron ore:

- BHP Billiton Limited (BHP)
- Rio Tinto Limited (Rio Tinto)
- Glencore Plc (Glencore)
- Vale S.A. (Vale)

Movement in top 40 market capitalisation \$ billion

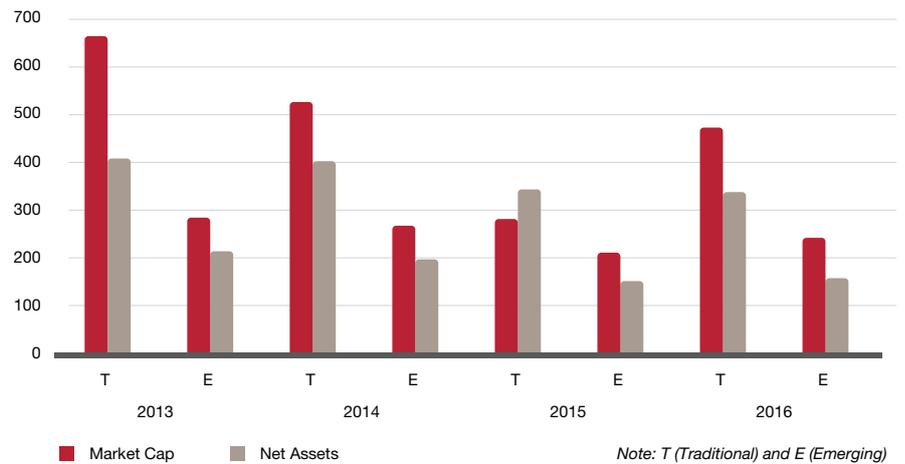


Source: PwC Analysis

The three largest increases as a percentage of 2015 market capitalization were Anglo American Plc (Anglo), Fortescue Metals Group Limited (Fortescue) and Teck Resources Limited (Teck). Anglo and Fortescue hold major iron ore assets. Teck, meanwhile, has significant exposure to steelmaking, coal and copper.

Traditional companies had larger gains in value, representing 86 percent of the total increase in market capitalization. Chinese companies did not receive much of a lift from rising commodity prices; this may be because they have less sensitivity to price changes and their investor base has fewer liquidity options (and limited investment alternatives) as the ability to invest outside of their country is limited.

Market Cap vs Net Book Value of Traditional and Emerging Companies (\$ billion)



Source: PwC Analysis

Balance sheets strengthened

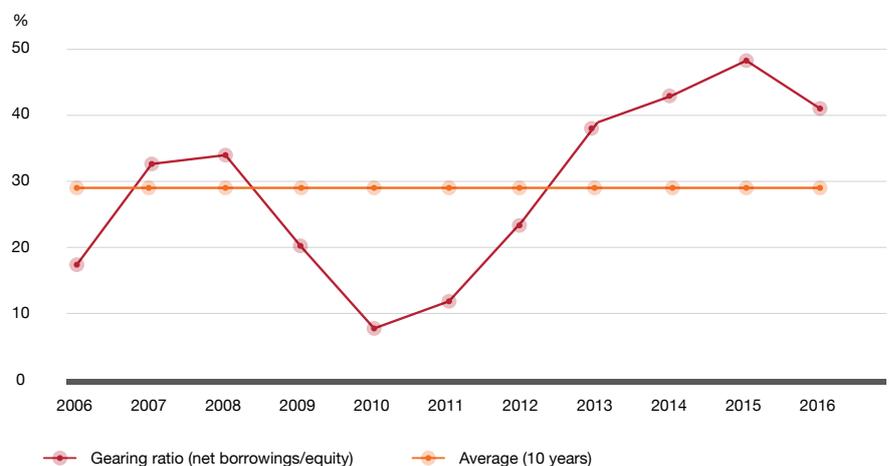
Miners put a strong effort into strengthening their balance sheets in 2016. Debt repayments totalled \$93 billion, up from \$73 billion a year earlier. Repayments were funded from three sources:

1. Increased cash flow from operations;
2. \$8 billion of asset sales and \$14 billion of minority stake divestments;
3. Issuance of fresh debt.

Asset sales in 2016 were largely strategic and most transactions appeared to be value accretive to shareholders rather than fire sales. Miners, especially diversified players, sold minority stakes in non-mining businesses. Most of the debt that was issued was used to refinance, rather than for acquisitions or mine development.

With the reduced borrowing, the Top 40 closed the year with a gearing ratio of 41 percent, a significant improvement from the 2015 record of 49 percent, but still well above the average of the last 10 years of 29 percent.

Top 40 gearing ratio (%)



Source: PwC Analysis



As a result of debt reduction, paired with the increase in market capitalization, overall net debt as a proportion of market capitalization for the Top 40 decreased significantly, down from 45 percent in 2015 to 28 percent.

Credit ratings agencies rewarded miners for their debt management strategies by upgrading a number of players. The average rating rose from just-above-junk BBB- to BB+, and some major miners, such as Anglo American restored their investment-grade status.

First Quantum's successful debt management strategy helped bring the company back into the Top 40. Similarly, Anglo and Freeport-McMoRan (Freeport) jumped up the rankings (to 9 and 10 respectively) as a result of drastic debt retirement and the avoidance of any new debt issuances in 2016.

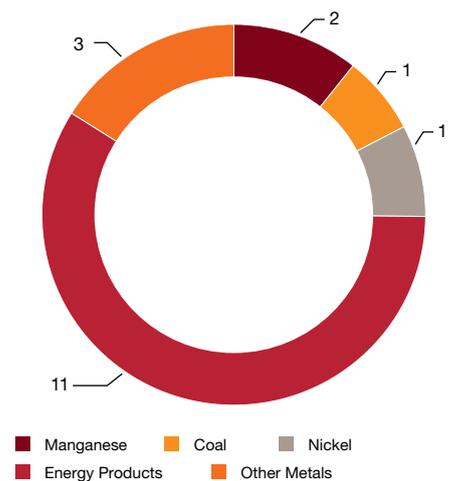
Impairments significantly reduced

After hitting a near-record in 2015, impairment charges tumbled last year to a less-alarming \$19 billion. Encouragingly, most of the recent impairments have related to non-core assets. Sixty-three percent of the 2016 total involved energy assets. Mining assets impaired included \$2 billion worth of manganese, \$1.5 billion of nickel and \$1 billion of coal. This is a far cry from the \$36 billion write down of core mining assets in 2015.

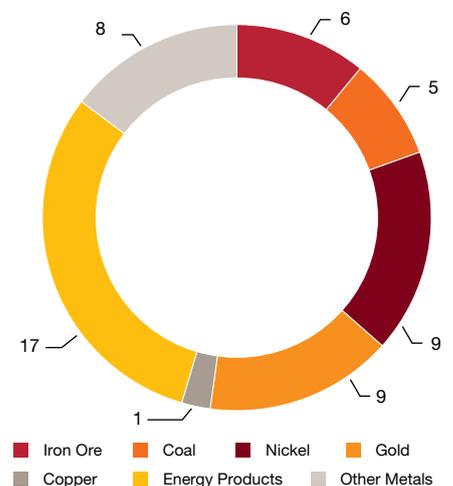
Notable 2016 impairments:

- BHP \$7.4 billion
- Freeport \$4.3 billion
- Balance of \$7.3 billion is made up by Glencore, Vale, Anglo American, Newmont and South32.

Impairments per commodity 2016 \$ billion



Impairments per commodity 2015 \$ billion



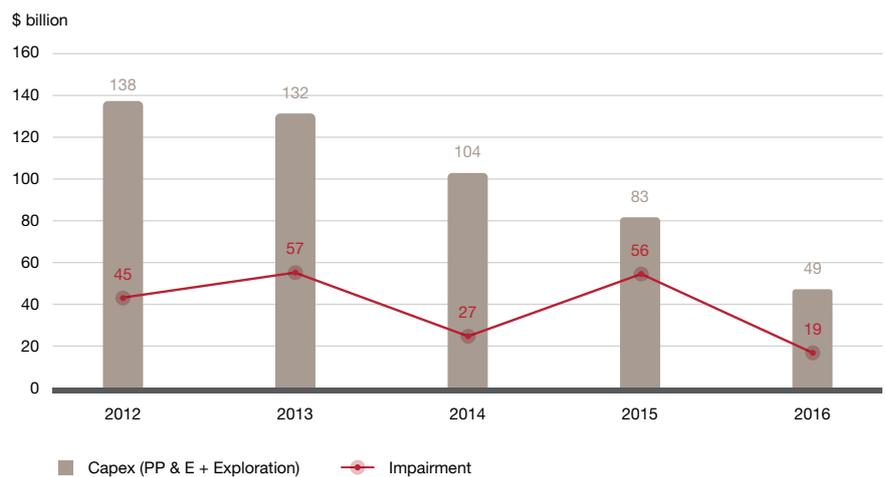
Source: PwC Analysis



Although the impairment charges tumbled in 2016, miners also scaled down on capital expenditure in 2016. Hence, impairments taken by miners were still almost 40% of the capital expenditure incurred in 2016. This percentage is close to the average of the impairment as a percentage of capital expenditures.

As part of the focus on the capital allocation and the under-pinning of their balance sheets, the Top 40 reduced the outflow related with capex. Closer inspection of the Top 40's 2016 capex revealed that approximately 50 percent of capex was related to sustaining activities, implying that only half of the \$49 billion was growth capital, with the remainder used to maintain operations.

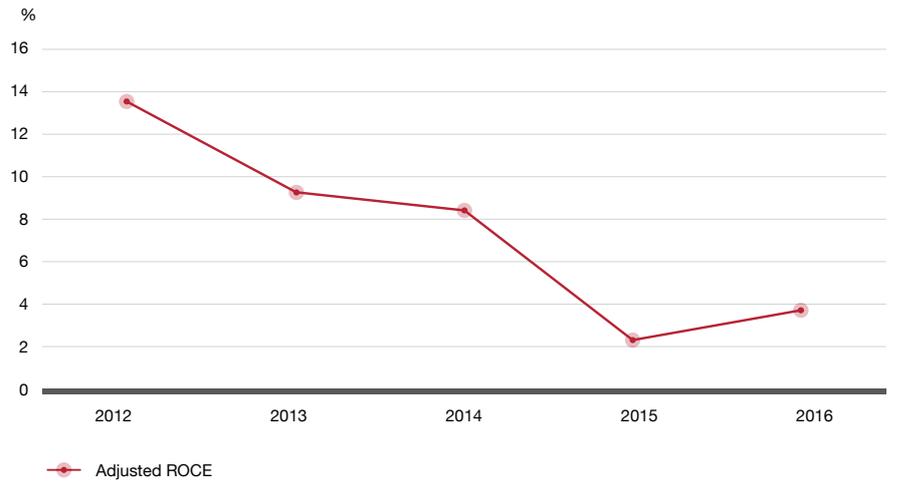
Capex vs impairment (value \$ billion)



Source: PwC Analysis

Impairment losses also were reduced, mainly due to the significant impairments recognized in the prior year and more stable business conditions. Although both indicators were below the prior year's level, it is important to highlight that the proportion of impairments/capex (2016: 39%) has reduced to a level that is similar to 2012 (33%) from the peak of 2015 (77%) which indicates that miners are responding to messages around capital discipline.

Top 40 adjusted return on capital employed (ROCE)



Source: PwC Analysis



Surveying the new terrain

The improving market has finally given miners more options to consider this year. It is now time for management to assess conditions, locate and understand the market's pressure points and map out where the next opportunities lie.

Core strength

Last year's *Mine* noted the strong rebound in commodities prices that commenced in Q1 2016. This trend broadly continued throughout the year, but it was a bumpy ride across commodities.

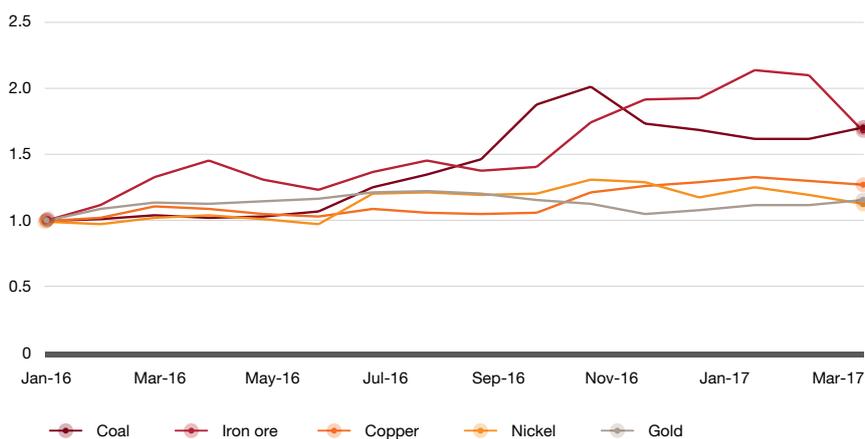
Gold (up 15%), copper (up 27%) and nickel (up 13%) were solid performers, but the real story of 2016 was the brawn of coal and iron ore prices, both of which were battered the prior year and took investors on a wild ride in 2016, Q1 2017, and even up to the date of this report.

Iron ore prices doubled to the end of the year, reaching a high of \$80 a tonne (CFR spot Australia). This trend continued in early 2017, with prices peaking at a 30-month high of \$89 a tonne in mid-February, only to suffer a sharp reversal thereafter.

The rally was sparked by a mix of stimulus in the Chinese steel manufacturing sector and speculative trading off the back of international news, such as the US presidential election in November. Sentiment turned abruptly when concerns emerged that China's port stocks of iron ore had risen dramatically. Fears of a glut crept in on the back of increased production from existing projects (the Top 40 were up 9% in 2015 and 6% in 2016) and the commencement of production at new large scale projects, most notably Vale's behemoth S11D mine.

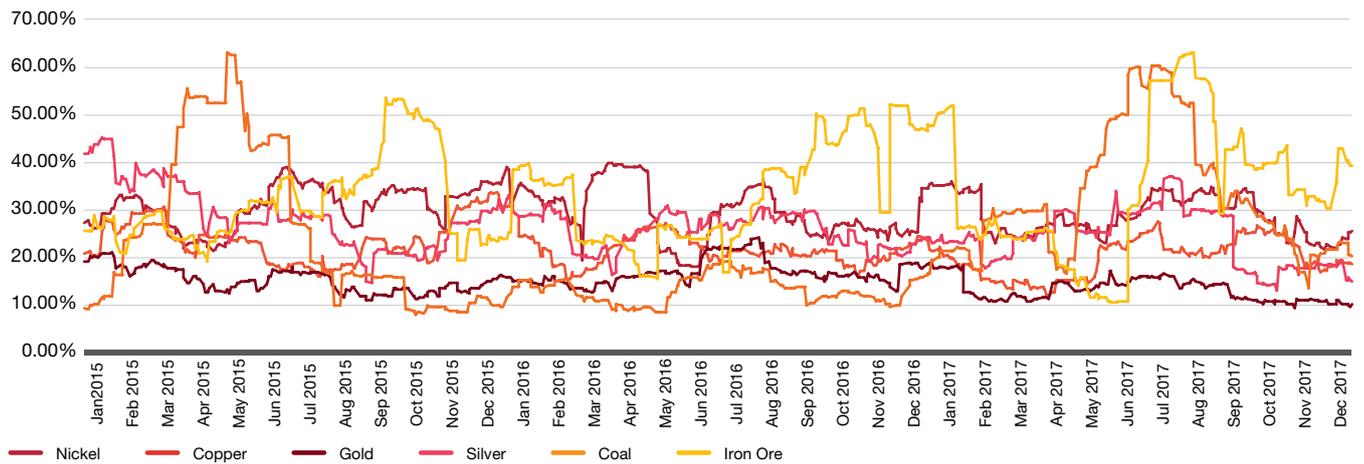
The story of coal prices in 2016 proved equally dramatic. Thermal coal prices doubled, reaching a peak of \$100 per tonne in November, before beginning a retreat in December that knocked 20 percent off prices and did not settle until after February 2017. Coking coal prices proved even more volatile, with monthly averages for Premium Hard Coking coal starting the year around \$80 per tonne and reaching a peak of \$300 per tonne in November. This rise followed China's announcement that it would reduce the number of coal mining days for the year. But when the government backedpedaled on the initiative, prices quickly reversed, falling back to \$150 per tonne. In 2017, supply disruption caused by Cyclone Debbie in Australia temporarily pushed prices back up to \$300.

Price indices, selected commodities (January 2016 = 1)



Source: The World Bank

Volatility, selected commodities



Source: PwC Analysis

“Fake news” and “really big” China

The world witnessed seismic developments in 2016, including the Brexit vote, the election of US President Donald Trump and the escalation of tensions on the Korean peninsula. Historians will likely study the political significance of these events for years, but in the mining business the reality is that the fundamentals of supply and demand towered in importance over every vote and personality of 2016.

The market volatility caused by political events caused overexcitement among speculators and short-term traders alike. It was easy to get preoccupied with the daily reporting of commodity price fluctuations and either baseless overoptimistic sentiment or dire predictions about the state of the industry.

The “Trump bump” agitated broader markets and appeared to offer significant promise to the resources sector in the form of increased infrastructure spending and an end of the “war on coal” in the US. However, our data suggest that it had little effect on prices other than in the short term. Certainly coal prices did not receive a lasting lift from President Trump’s election. Similarly, iron ore prices, which began Q2 2017 in free fall, indicate that there is no sustainable value despite the early optimism regarding a US infrastructure boom. Rather, the story remains one of Chinese financing, as well as demand and concerns of excess supply.



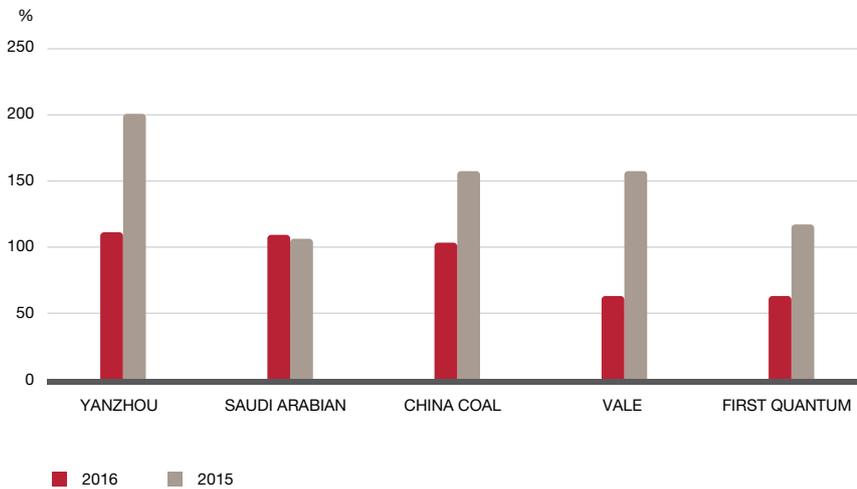
What may be a more interesting story to explore in *Mine 2018* is the effects of real policy change in the US, rather than the current rhetoric. At the time of writing, President Trump had scored his first major win with the planned repeal of Obamacare passing the House of Representatives. If he can begin to achieve traction on other proposed measures, such as significant tax reform and infrastructure stimulus, then we may see more lasting impact on commodities prices through 2017, and not just short-term volatility.

Alleviating distress

The rebound in prices provided miners with the opportunity to focus on debt repayment. Members of the Top 40 diverted cash away from dividends and investments and used it instead to reduce liabilities. At the same time, the fire sale of assets reduced to a trickle (see “Balance sheets strengthened” on page 9).

As a result, net borrowings (borrowings less cash) fell from \$239 billion to \$202 billion and leverage ratios improved, while liquidity ratios remained stable. Net borrowings to EBITDA fell from 2.60 to 1.89. The five most leveraged companies in 2015 cut their debt ratio from 2.0x to 0.7x, although Vale and Yanzhou remained among the five most leveraged companies in 2016.

Net debt as % of Market Cap for Top 5 leveraged companies as of 31 December 2016



Source: PwC Analysis





Source: PwC Analysis

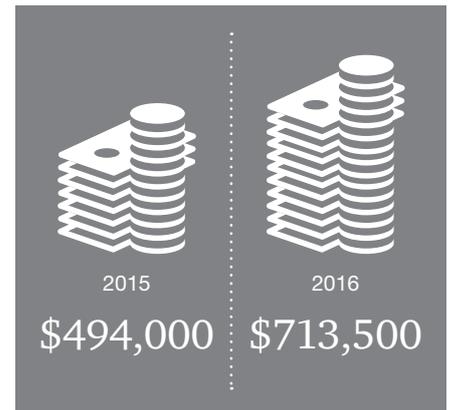
The exception was a number of the larger Chinese miners who were never considered distressed in the first place, and who continued issuing debt to fund growth.

With the significant rise in free cash flow (up to \$40 billion from \$13 billion), miners were also able to avoid pressure to pay down debt using other, expensive sources of capital. Total capital raising fell from \$94 billion to \$74 billion, and nearly half of this was due to the dramatic drop in equity raising (down to \$3 billion from \$22 billion). Some would argue that miners couldn't raise equity given the market environment, but there was a window for IPOs and secondary issuances in 2016 for those who wanted it, for example on Canadian bourses. Rather, it seems that the low P/E ratios at the beginning of the year led miners to avoid diluting and raising the ire of major shareholders who had bought in at the top of the cycle a few years prior.

Alternative financing

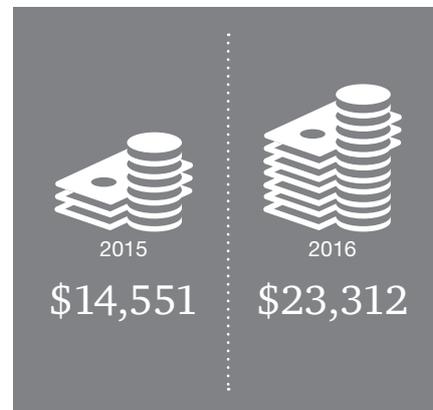
Innovative use of alternative financing has helped relieve distress by allowing mining companies to raise capital more cheaply, without diluting existing shareholders. During the worst of the cycle in 2015, alternative financing companies provided a lifeline to some of the Top 40. Four companies alone raised more than \$3 billion in capital from alternative financing companies.

Top 40 Market Cap



Source: PwC Analysis

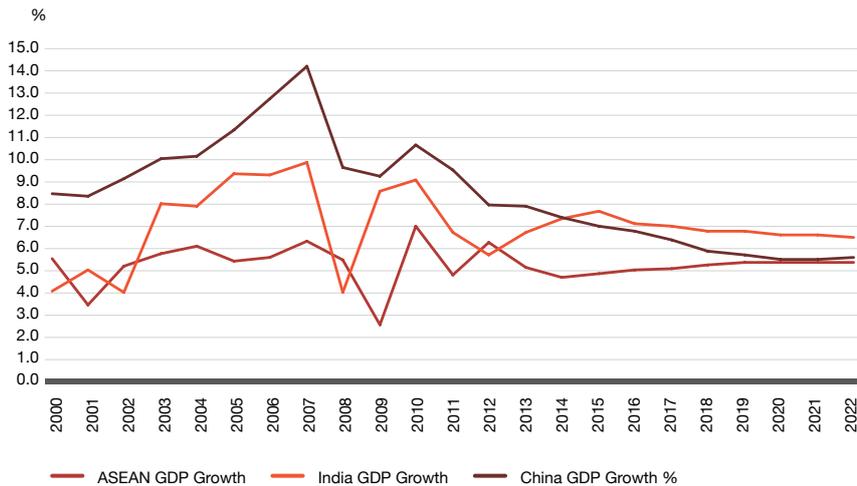
Royalty Companies Market Cap



Source: PwC Analysis

Alternative financing companies that included Franco-Nevada, Silver Wheaton, Royal Gold, Osisko Gold Royalties and Sandstorm, have taken full advantage of the commodity cycle, acquiring and investing in assets at the bottom of the cycle. Their business model has rewarded investors: with EBITDA up more than 40 percent in the year, the combined value of alternative financing companies increased considerably more than that of the Top 40 (58 percent versus 45 percent), with the top three financiers enjoying a rise of 61 percent.

China, India and ASEAN-5* GDP Growth



Source: IMF

Alternative financing companies have achieved premium valuations relative to the Top 40. By the end of 2016, they traded at 1.3x price to net asset value (P/NAV), whereas the Top 40 traded at 1.0x P/NAV. Alternative financing companies have been able to take advantage of this valuation gap to purchase royalties and metal streams at a substantial premium to the market, creating a win-win, especially during market downturns.

At the bottom of the cycle, both equity markets and debt markets were closed to a large number of pre-production miners, who turned instead to alternative financing companies that provided financing through metals streaming and royalties.

Although valuations for metal streaming transactions and royalties may occur at a premium during the downturn, they can hurt mining company shareholders over the long term if they give away too much future value. For this reason, we expect members of the Top 40 to reduce the number of these financial deals as conditions continue to improve. There will, however, always be a role for alternative financing companies to fund the development projects of companies that have less access to capital.

Finally, companies such as Glencore have used alternate strategies, such as hedging, to improve or at least secure their bottom line (refer to the income statement analysis). In a similar vein, in 2016, we saw BHP re-enter the hedging market (for off-shore gas), a move which was well received on the whole.

China's big shoes

China maintains its dominance over the global demand for metals. As one of the world's largest economies, it consumes more than 40 percent of the world's copper supply, and it remains the leading importer of iron ore.

But Chinese demand needs to be monitored closely, as anticipated declines will impact global bulk and base metals commodity prices. Iron ore prices, for instance, are threatened by the possibility of a looming decrease in Chinese steel production.

At this point, it is difficult to know whether any countries will be able to fill the demand gap that will be left as China's growth slows in the coming years. India and the ASEAN-5 (composed of Indonesia, Malaysia, the Philippines, Thailand and Vietnam) offer the best opportunity. India's GDP growth has exceeded China's for several years and the economic expansion of the ASEAN-5 is now almost on par with China's.

The Chinese rate of growth has declined for a decade. Some expect it to settle at around 6 percent however it's difficult to find consensus on that figure. This remains a robust rate and means that China will continue to play a significant role in driving demand in the mining industry. The critical question is how that demand will be satisfied.

China: in the driving seat

During the downturn, Chinese companies demonstrated one enormous advantage over other miners in both traditional and emerging countries: access to capital.

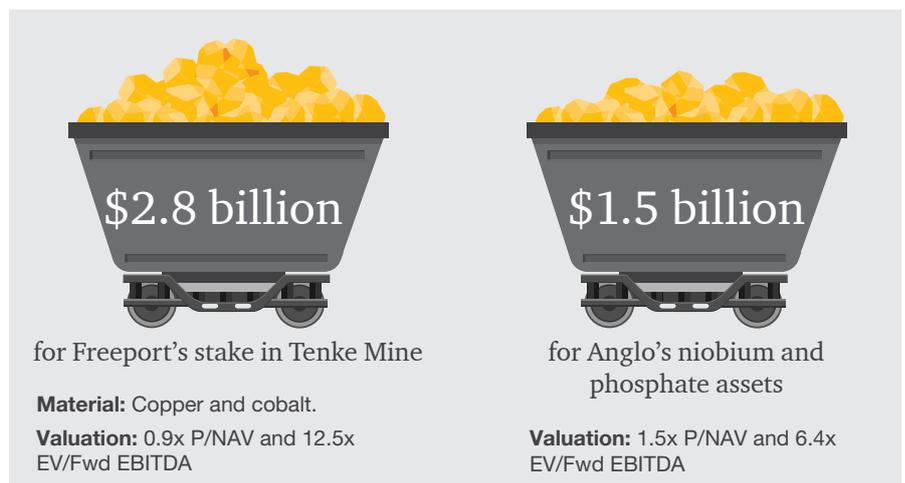
With deeper pockets than their competitors, Chinese players were able to fund more acquisitions than their counterparts, either snapping up assets at premium prices or buying opportunistically.

We also witnessed an increase in acquisitions by Chinese private equity firms, and we expect China to continue to be active in acquiring global mining assets as a way to reduce its dependency on imports.

One variable worth watching, however, is concerns regarding restrictions on capital outflows by the Chinese government. We have recently seen, for example, tighter approval processes for foreign acquisitions by Chinese companies, although these are not specifically targeting. The Chinese government said in February that the new measures are only directed at reducing suspicious or fraudulent transactions.

Valuations of Chinese companies in the Top 40 are trading well above the rest of their peer group (18.7x EV/fwd EBITDA versus the 8.5x EV/fwd EBITDA). This gap gives Chinese companies additional capacity to pay substantial premiums for assets.

Most notable among Chinese mergers and acquisitions during 2016 were the deals by China Molybdenum Co., Limited (China Moly), a new addition to the Top 40 that moved quickly to acquire assets from other members of the group. The company bought the niobium and phosphate business from Anglo, as well as Freeport's share of the Tenke mine that produces copper and cobalt.



Fire sales dampened

One of the biggest M&A stories of 2016 concerned the assets that did not sell. Numerous large deals that we were expected to be completed by early 2017 were withdrawn from the market, possibly due to the rebound in commodity prices and the improving prospects of the companies that owned them.

Among the anticipated deals that failed to materialize was the sale of Anglo's Australian coal assets at Moranbah and Grosvenor mines as well as Kumba Iron Ore in South Africa. Analysts and market watchers had expected Anglo to proceed with the divestitures as part of the company's announced debt reduction strategy. They had expected the Moranbah and Grosvenor mines to sell for more than \$1 billion.¹

Anglo's decision to keep these assets proved that even in a declining market, companies will continuously reassess alternatives. Instead of selling, Anglo was able to maximize cash flow from these assets and use the funds to reduce debt.

Notable transactions among Top 40 miners



1. <http://www.afr.com/business/mining/anglo-american-keeps-australian-coal-amid-backflip-20170221-gui7w7>

Calibrated action

The industry has confronted price demons in recent years, overcome its production hangover and driven liquidity threats into retreat.

The rehabilitation process has involved the pain of write-offs, the shedding of discounted assets and the slashing of capex and exploration budgets. Following management's use of prudent cost controls, alternative financing and technological advancements, the recovery process is well advanced and the industry now stands at a critical juncture. How will it proceed?

Looking back at this same point in previous cycles, one could apply the benefit of hindsight and say miners made significant mistakes. The failure to invest in exploration and capex in the last downturn added fuel to a super-cycle fire, already lit by Chinese demand. The industry found itself forced to buy high to keep up with production aspirations and meet voracious demand. By 2012 the cycle had begun to turn and we saw the beginning of record write-offs of investments made at the top of the cycle, excessive debt relative to realistic asset values and, ultimately, distress across the sector.

Are we condemned to repeat history or will we remember this time as a tipping point for the industry?

The mining sector faces lengthy development cycles and its investment horizon should be equally long. The greatest opportunities may already have been missed, as the rising P/E ratios for companies and P/NAV ratios for assets discussed on page 7 for P/E ratios page 17 for P/NAV ratios. But intuition would say that now, at this point in the cycle, is often the best time to invest.

None of the Top 40 companies announced any new projects in 2016, although five of their mines did commence commercial production.

We are certainly seeing a different and more confident investment behaviour by the emerging companies this time round, most notably the prominence of China in recent M&A deals.

It is also worth noting that, beginning in the back half of the year, members of the Top 40 reported a significant upswing in the number of positive project milestones and a decrease in the number of negative milestones. Examples include the decision of Freeport to curtail mining and milling operating rates and to operate at 75 percent in its Sierrita open-pit copper and molybdenum mining complex located in Tucson, Arizona in response to lower prices. Another example is Glencore moving its Black Star mine in Queensland, part of the Mount Isa Mines complex, to care and maintenance after mining out the existing reserves. We expect this trend to continue throughout 2017.

Parts of the industry have already invested in cost control measures and technology (see page 19). Hopefully, these initiatives will be maintained through the cycle and we won't see missed timelines and cost blow outs on capital projects as in the past.

“Those who cannot remember the past are condemned to repeat it.”

George Santayana



But operating expenses will surely expand again this cycle, with factors such as currencies and wages nearly impossible to control. And, with a lack of investment in exploration and new projects, the Top 40 may again find themselves with a diminished project pipeline, decreased reserves and out-dated equipment and facilities when the cycle accelerates. This scenario suggests that, excluding the China effect, growth will again be driven by mid-caps and juniors, whose own valuations will temporarily soar and spark another round of aggressive M&A by the Top 40.

It is easy to criticize, especially when investment choices are made in real time and require the trust and confidence of investors in management to make long-term decisions. But will boards be bold enough to resist short termism? Do companies have the right diverse and talented management to take advantage of this reprieve and move the companies into the future? Will they embrace rigorous, disciplined decision-making?

Let's hope so. A possible indication may be Rio Tinto's recent announcement of a "10-year mandate" for its current CEO. What is certain is that the mining sector needs to be more compelling with its story to the market, so that it is able to resist shareholder pressures, for example, to pay dividends at the bottom of the cycle.

We expect that China will continue to be the main driving force behind commodities prices and subsequently the fortunes of the Top 40. But we also have our eye on the newly-empowered players in the consumer sector whose presence is growing on the sidelines.

Should the industry take seriously Apple's question, "Can we one day stop mining the Earth altogether?" or Elon Musk's 100-day guarantee to fix a state's energy crises with battery technology? Whether miners choose to put any faith in these ideas or not, it is essential that they recognize the forces of change now at play. Is the mining industry doing enough to show they are considering all stakeholders, not just shareholders? They've shown they have strengthened their balance sheets, but are mining companies doing enough to show they are strengthening stakeholder value as well?

Will the industry stick to the comfort of its roots? BHP is already facing a case of shareholder activism demanding such a shift. To date, the Top 40 by-and-large have not signalled their intention. But given the growing strength of their balance sheets and rising valuations, they now have options and must begin taking informed action.

While the traditional miners have maintained their hold on the Top 40 listing they need to ensure they have the agility to adapt. It is important to realize that the rules are changing. Of the emerging companies in the Top 40, more than half are owned in part by their local governments and as such have access to financing outside of traditional capital markets.

The Top 40 have done well to move cautiously past the market cave-in. Now, as they gear up for action, it is essential that management apply the lessons learned from the past, focus on sustainable long-term growth and avoid repeating history.



Going digital



Conventional mining today has become increasingly expensive, as miners reach deeper into the earth to find profitable ore bodies and work their way through decreasing grades of ore. This cost challenge is exacerbated for miners with large and/or remote asset bases who are often struggling with basic performance issues, including high maintenance costs, low reliability, reactive fixes, low utilization rates and safety incidents.

In response, companies are focusing on improving productivity. To truly achieve performance breakthroughs, however, they will need to rethink how mining itself works, a process that demands digital innovation.

New technologies promising a boost for the sector include software to optimize asset utilization, devices to remotely monitor and control activities, and robotics for the automation of repetitive tasks.

The benefits of asset optimization tools are significant. Separate analysis by PwC estimates that they can help companies lower maintenance costs by as much as 20 to 40 percent, increase asset utilization by up to 20 percent, reduce capital expenses by between 5 and 10 percent, and also improve environmental health and safety.

A number of miners have announced or implemented digital innovations that are enhancing performance. Rio Tinto,¹ for example, has built a remote monitoring and control facility that can connect with mines all over the world in real time.

By using the technology to collect data from trucks and processing plants and then analyze the information for efficiency opportunities, the company says it has reduced costs by \$80 million.

Barrick last year announced that it would work with Cisco Systems on the “digital reinvention” of its business. The plan will see Barrick² embed digital technology in every dimension of its Cortez mine in Nevada to deliver better, faster and safer mining. Advanced sensing technology and real-time operational data will be used to inform decision-making. Equipment will be automated for increased productivity, while predictive algorithms will enhance the precision and speed of maintenance and metallurgy.

When Vale³ cut the ribbon late last year on its S11D project in Brazil – one of the world’s largest iron ore mines – the project boasted one of the lowest cash costs per tonne, partly because of increased operational efficiency achieved through investments in innovation and technology.

The S11D mine uses an array of technologically advanced processes, including a truckless system for conveying ore, which Vale says cuts fuel costs by 77 percent and also reduces waste and greenhouse gas emissions. A natural humidity process, which uses humidity in the ore itself to remove impurities, reduces water consumption by up to 93 percent. In addition, an advanced automation and control system regulates the supply of raw materials according to process demands and simulators assist with the training of wagon-loads operators.

BHP⁴ has improved both safety and profitability by using drones fitted with military-grade cameras and are able to transmit real-time aerial footage and 3D maps. The company estimates that it is saving \$5 million a year at its Queensland sites alone by replacing planes with drones for some survey work. The remotely-operated devices are also employed to ensure areas are clear before blasting and to track fumes after a blast.

In addition, maintenance teams use drones to help inspect overhead cranes, towers and roofs of tall buildings, removing the need for individuals to work at height.

Understanding that artificial intelligence has become an essential tool for improving processes and outcomes, Goldcorp recently began using IBM's cognitive computing system, known as Watson. Unlike traditional computer systems, which are programmed to perform specific tasks, cognitive computing systems have the ability to "learn" through their interactions with both data and humans. The technology has the potential to transform every facet of the mining process, according to Goldcorp.⁵

Of course, innovation is not all about the upside; digitization presents its own set of challenges for the industry, including costs, cyber risks, the lack of a digital culture within mining companies and the need for technology training.

Today's cutting-edge innovations may not even exist in five or 10 years. The speed of change is so great that companies must build flexibility into their plans and their workforce to accommodate the disruptive force of technology during the long life of a mine.

While new technologies can be costly to acquire, implement and maintain, the payoff can be significant. Mining companies that genuinely understand technology, and leverage it strategically, will benefit the most.

With the digital world presenting so much potential risk, opportunity and disruption, mining companies need to be agile when thinking about how to align technology with business needs, and they must make the right choices on partnerships and implementation.



While new technologies can be costly to acquire, implement and maintain, the payoff can be significant. Mining companies that genuinely understand technology, and leverage it strategically, will benefit the most.

1. Rio Tinto – From PwC slides Industry 4.0 – From Vision to Reality/From Facility to Mine November 3rd, 2016 – PwC

2. Barrick – <http://www.barrick.com/investors/news/news-details/2016/Barrick-and-Cisco-Partner-for-the-Digital-Reinvention-of-Mining/default.asp>

3. Vale – <http://www.vale.com/en/initiatives/innovation/s11d/Pages/technological-progress.aspx>

4. BHP – <http://www.bhpbilliton.com/media-and-insights/prospects/2017/04/how-drones-are-changing-mining>

5. Goldcorp – <http://www.goldcorp.com/English/blog/Blog-Details/2017/IBM-Watson-Gaining-New-Exploration-Insights-Through-Artificial-Intelligence/default.aspx>

Exploration budgets – looking for safety



Commodity prices rebounded last year but mining companies opted to play it safe, deferring to investors' demands and expectations rather than investing in exploration at a time when costs remain low.

For the fourth straight year, the industry reduced spending on exploration, bringing expenditures to barely one-third of the record \$21.5 billion allocated in 2012 to \$7.2 billion in 2016, according to research according to research by S&P Global Market Intelligence. The S&P annual Corporate Exploration Strategies report looked at the budgets of 1,580 companies worldwide. It found that spending in 2016 amounted to just \$6.9 billion, 21 percent less than in 2015, as the sector placed projects on hold and favoured less risky, later-stage assets.

Gold remained the most sought-after asset, attracting 48 percent of exploration dollars, followed by base metals at 31 percent.

We don't expect that the budget for coal (see page 27) or iron ore will increase significantly in 2017. Several of the iron ore advanced stage projects initiated during the boom that were subsequently shelved in recent years have been revived; but will not warrant significant expenditures.

With respect to iron ore, Australian is the clear leader with 47% of the \$454 million global budget for the commodity. Consistent with the prior year trend for other non-ferrous metals, this was a significant decrease to 2015 (by approximately 47%). Reasons are various for the decrease but with significant reserves and without strong and long-term demand there is not much room for investment.

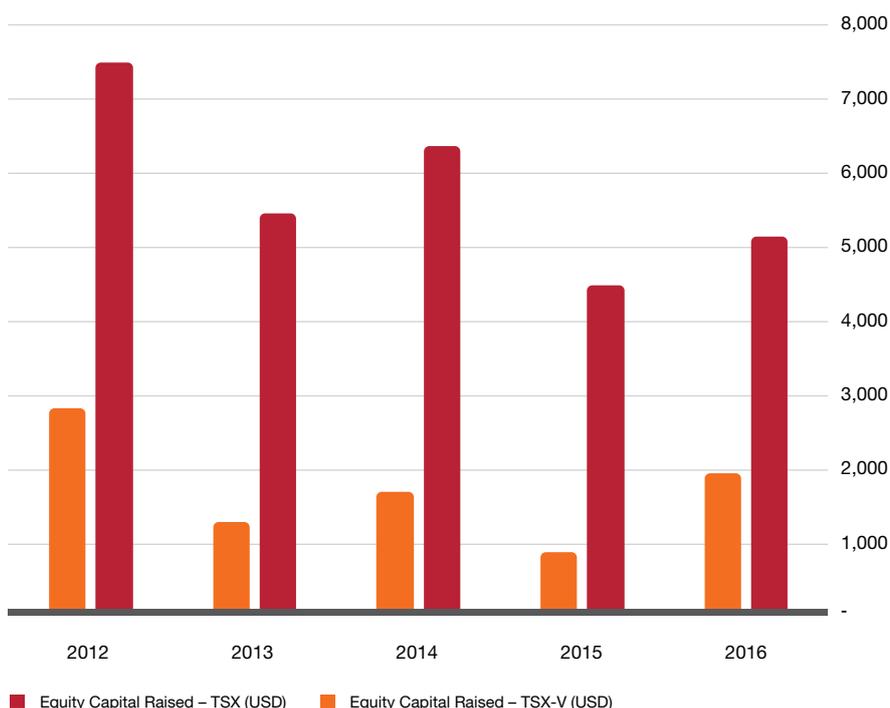
Canadian stock exchanges continue to be a leader in the global mining markets. In 2016, approximately 57% of the global mining financings were raised though the TSX and TSX-V according the TMX Group and S&P Global Market Intelligence.

The belt-tightening occurred across the sector, from the exploration departments of majors such as Freeport, Vale and Barrick, to the offices of aspiring junior miners. Among the few exceptions within the Top 40 was China Moly, which boosted its exploration budget by approximately \$14.5 million.

Among the companies surveyed by S&P, however, the median exploration budget in 2016 was the smallest amount in more than a decade. Juniors accounted for 39 percent of the overall decrease and majors 36 percent.

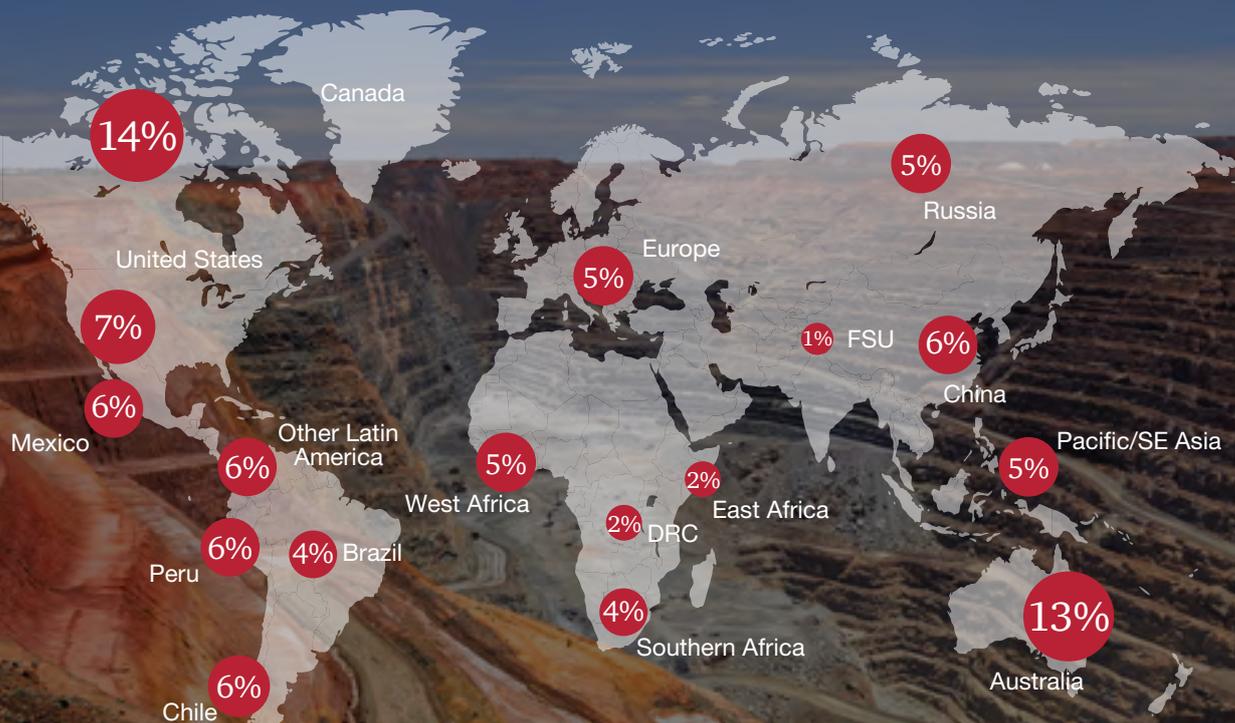
As the mining industry seeks to reassure nervous and discontented investors, it is not providing them with organic growth options for which many experts pay. Not surprisingly, less funding unearthed fewer discoveries. There were 55 initial resource announcements last year, up from just 44 a year earlier, but still a long way from the peaks recorded in 2012 of 168 announcements.

Raised in the Canadian stock market (USD)



Source: TMX Website and PwC Analysis

Top Destinations for Mining Exploration



Other locations account for 3%

The US showed the sharpest pullback in exploration last year, with its budgets falling more than 30%, although gold and copper exploration helped the country account for a 7% share of the global total. Nevada had the largest share (47%) of the US budget, with two other states, Arizona and Alaska, together accounting for a further 22% of the total.

Source: S&P Global

This guarded, frugal mindset means mining companies will continue to set their sights on brownfield projects, where the risks and potential payoffs are fewer. The industry is also relying heavily on resources from the safest political geographies. Canada and Australia attracted more of the global exploration budget than any other country, at 14 percent and 13 percent respectively.

In contrast, Africa suffered one of the largest pullbacks in investment of any region. The entire continent absorbed only 13 percent of global spending in 2016, according to the report.

Improving economic conditions suggest that large mining companies will begin to reverse the spending decline this year, but S&P expects the exploration budgets of junior explorers to slip further in 2017 – even though many of them have found it increasingly possible to raise funding since March 2016.

Rather than moving boldly to take advantage of today's relatively cheap supply of labour, equipment and services, almost all players are standing on the sidelines, watching to see who will move first.

What will trigger the next cycle of investment remains unclear, but it is unlikely to match the lasting force of China's economic boom that launched the last spending spree beginning in 2003. We do believe, however, that companies that fail to take advantage of today's opportunities and low costs will eventually find themselves riding the same boom–bust cycle that has defined the industry for so long.

CSR: Refining the story



The industry has faced a number of sustainability challenges over the past few years, often manifesting themselves as roadblocks, social protests against big projects and difficulty in accessing finance for perceived ‘dirty’ projects. In 2016, a new challenge emerged from the industry’s more consuming facing customers, as demonstrated by Apple’s announcement to increase metals recycling and reduce reliance on mined minerals.¹

These threats may seem remote, but public support may speed their adaptation of manufacturing processes to incorporate more recycling. Mining companies would do well to get on the front foot – understanding, managing and reporting their impacts and selling their successes. A lost license to operate is the biggest impairment of all, and the industry must protect its valuable ‘brand’ with all stakeholders.

There is an increased need for information that is clear, transparent, timely and assured. This is key to building investor confidence and improving future results.

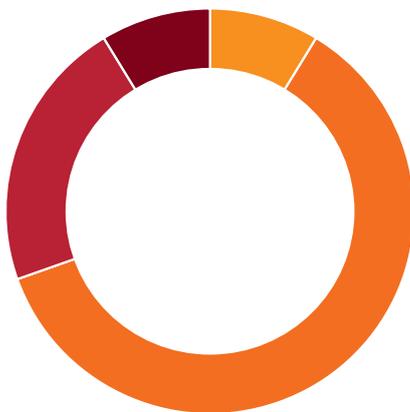
There are many major sustainability reporting initiatives, such as the Global Reporting Initiative (required reporting for International Council of Metals and Mining members (ICMM)) and the Extractive Industries Transparency Initiative (EITI), but the industry still has a mixed record. Approximately 90 percent of the Top 40 report to GRI and 40 percent are EITI members² (although actual EITI reporting takes place by country and may include non-members, corporate membership signifies a broader commitment to transparency). Of the 23 companies that are International Council of Metals and Mining members, nine (or 39%) independently assured their GRI Reports in 2015 (or Integrated Report).³

GRI compliance requires reporting on a wide range of metrics, including: governance standards; ethics & integrity; anti-corruption and procurement; energy, GHG and other emissions; water pollution; biodiversity; health & safety; non-discrimination, diversity and indigenous rights; and local communities.

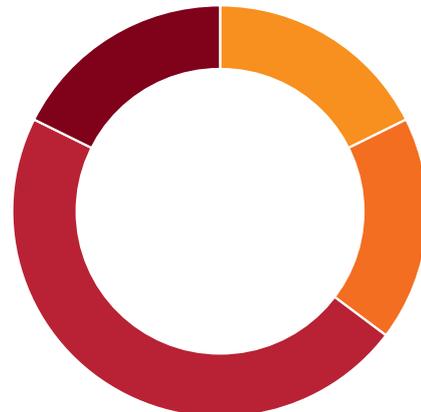
GRI compliance is significantly higher among Traditional companies (see chart), while Emerging companies are either using other standards or not creating Sustainability standards (illustrated by “other” in the chart below).

Some companies find such tasks complex and onerous and stakeholders can be overwhelmed by long reports with irrelevant information that is not designed for their sectors or needs.

Traditional markets



Emerging markets



■ GRI-Comprehensive-compliant Sustainability Report
 ■ GRI-Core-compliant Sustainability Report
 ■ Other
 ■ No Sustainability Report

Source: GRI 2016 report (based on 2015 Annual Reports)

1. www.apple.com/au/environment
2. <https://eiti.org/supporters/companies>
3. <https://www.icmm.com/en-gb/members/member-reporting-and-performance>

| % reporting quant. KPI for 2016 | Safety | Water Use | Carbon/GHG emissions | Value Added and/or Distributed | Diversity |
|---------------------------------|--------|-----------|----------------------|--------------------------------|-----------|
| Emerging | 42% | 42% | 33% | 17% | 42% |
| Traditional | 82% | 73% | 68% | 59% | 68% |
| Total | 68% | 62% | 56% | 44% | 59% |

Source: PwC Analysis

Note: Excludes certain companies for which annual reports were not available.

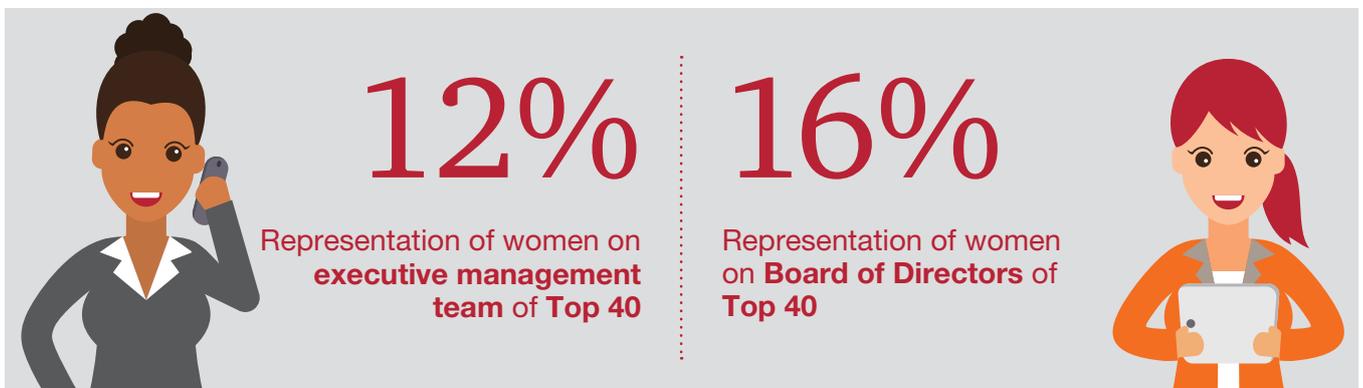
To try and cut through the reporting burden, we performed a review of the Top 40 Annual Reports and CSR Reports, looking at which companies reported data in a timely manner.

The guiding principles were that the information should be:

- **Timely**; only reports that were released alongside the most recent financial information were considered
- **Focused**; only 5 of the most common mining indicators were considered
 - safety,
 - water use,
 - carbon/GHG (greenhouse gas) emissions,
 - reporting on economic value added to stakeholders, and
 - diversity.
- **Measurable**; only quantitative data, linked to the entities' key performance indicators, was considered.

The results show that around half of companies produce timely, quantitative data on key sustainability metrics. Traditional miners report around twice as often as Emerging miners. Across both groups, companies are most focused on safety, followed by diversity and environmental issues, with economic contribution coming last.

Given mining companies' substantial GDP contributions in many countries, including infrastructure spending and general CSR investment, this again points to the industry underselling their contribution. With increased global social activism, it is more important for miners to tell their story in a compelling way, to connect with stakeholders and avoid losing their license to trade.



Source: PwC Analysis

Coal without fire



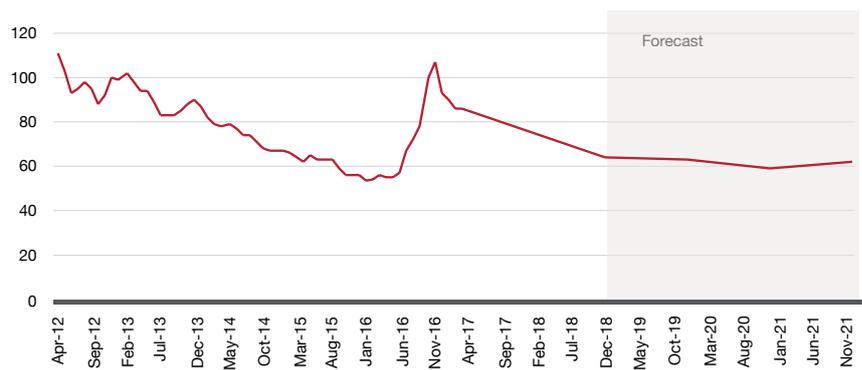
Urbanization and industrialization in emerging Asian economies have continued to provide support for many commodities, none more so than both metallurgical and thermal coal in 2016. However, while industrial demand for steel in large infrastructure projects means that there should be a healthy market for metallurgical coal well into the future, the flame may be fading for thermal coal, as the move to gas and renewables in the power market accelerates, driven by environmental concerns.

Thermal coal

Thermal coal prices went for a wild ride in 2016 (see Commodity Prices on page 14) with a significant increase from mid-2016 after several years of depressed prices. While prices have stabilized at these levels in 2017, analyst expectations are for a gradual decline in Asian prices¹ from the present range of \$70-80/tonne, to about \$60-70/tonne in 2021. This softness largely reflects an overhang of supply in the seaborne market, as well as the perception that the Chinese government is committed to moving steadily away from coal towards renewables.

Coal's significance to the energy market in the short-to medium-term, however, is not about to diminish. Asia in particular is going to continue to consume vast quantities of coal for electricity generation. Outside of China, Asian coal-fired capacity will double by 2040, according to the US Energy Information Administration's 2016 *International Energy Outlook*.

Newcastle Coal Spot Price, Historical 2012-17 and Analyst Expectations 2018-2021



Source: From December 2018, analyst forecasts for Newcastle Spot Contract, FOB, 6,000 kcal/kg GAR Consensus Economics Survey. Before March 2017, historical data for same Spot Contract.

India's share of world coal demand will double by 2035, as it rolls out hundreds of gigawatts (GW) of new coal power plants (although much of this will be domestically supplied as the government imposes reforms on the sector). Indonesia is planning 35 GW of new capacity by 2019, more than half of which will be coal-fired. Bangladesh plans to revise its energy mix and look towards coal-fired plants as its natural gas reserves continue to dry up; while Vietnam and other Southeast Asian nations are still looking to coal as the cheapest way of rapidly expanding power capacity.

These trends should support gently rising production volumes over the next five to 10 years. But the broader economics of the industry look uninspiring, and prices may plateau as environmental regulation ramps up worldwide. Technological advances and economies of scale are also likely to see the economics of building plants powered by gas and renewables improve dramatically, reducing the current cost advantage of coal-fired power.

In the United States, natural gas briefly achieved cost-parity with coal in 2016, and a \$15/tCO₂ carbon price would reinforce this. President Donald Trump's headline policies to assist the domestic coal industry will do little to change the harsh economic realities, and utilities will be reluctant to invest in new coal-fired assets that risk becoming stranded under the next administration's energy policies.

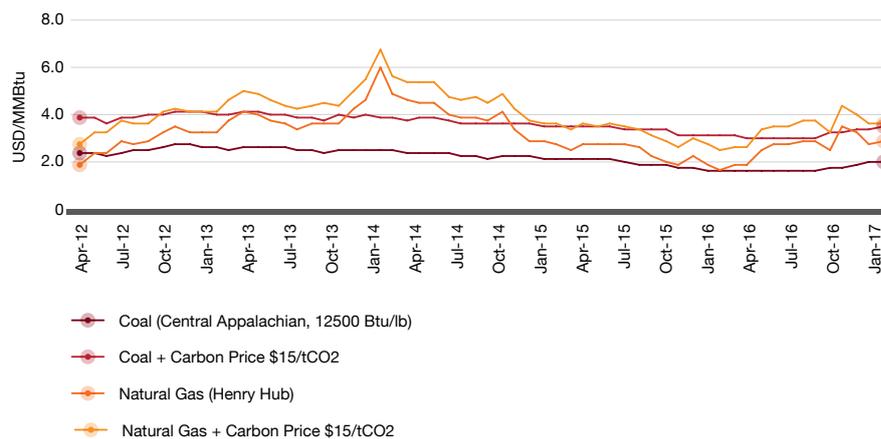
Within the US and beyond, government subsidies have helped launch wind and solar in the markets. Now economies of scale are making unsubsidized renewables – which essentially enjoy zero marginal costs – competitive against coal and gas.

As we first warned last year, weakness may reappear in the longer-term due to the anticipated drop in demand for coal to fuel power plants in many parts of the world. Consumption of thermal coal among members of the Organization for Economic Co-operation and Development peaked a decade ago. China will likely reach that tipping point in five years, according to forecasts from BP. Indeed, China has yet to exceed its 2013 peak coal consumption.

1. Newcastle Spot Contract, FOB, 6,000 kcal/kg GAR



Fuel prices with and without CO2 pricing



Source: Coal – EIA Central Appalachian, Assumed carbon content 90 kg CO₂/GJ, Natural Gas – World Bank Commodities Prices, Assumed carbon content 53 kg CO₂/GJ

As the price of wind and solar power plunges, China, India and other countries across Asia are working to make renewables a significantly larger portion of their power mix. China aims to invest \$361 billion in renewables by 2020, more than three times what it spent in 2015. And, at the end of this year, China is launching its first nationwide carbon trading market, with prices expected to be in the \$10-20/tCO₂ range.² India, meanwhile, is targeting 175 GW from renewables in 2022, five times this year's target, as it removes 50 GW of planned coal-fired plants from the pipeline. The Indian government has increased its carbon tax eight times since 2010 and aims to derive approx 57 percent of the nation's power from green energy by 2030.³ At the moment, 70 percent of India's power is dependent on coal-fired plants.

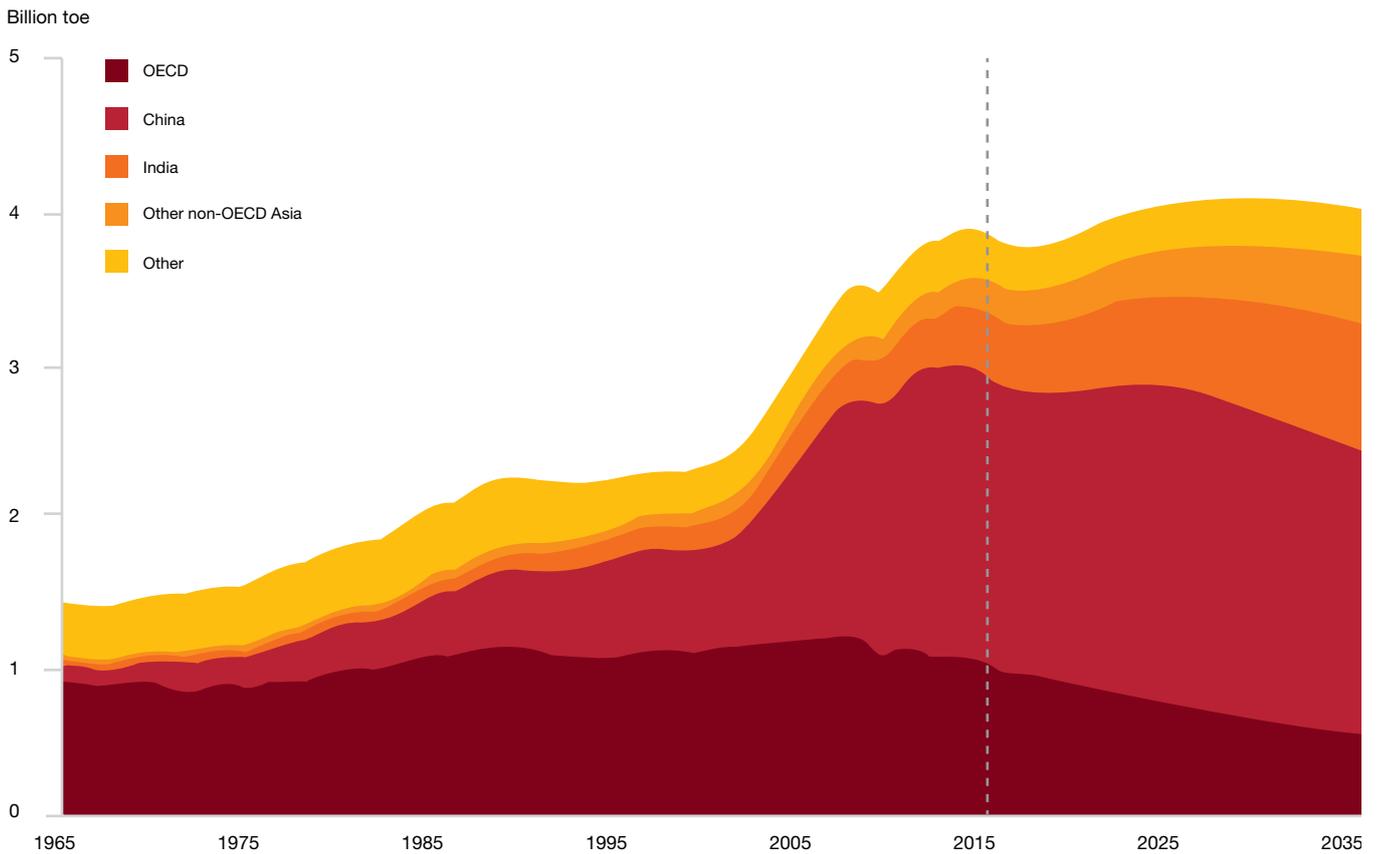
Although volume growth will be fundamentally limited on a global basis, profitability will depend on how well producers manage their costs and balance supply and demand in individual regions. The five pure-play coal companies in the Top 40, all based in China or India, remained insulated from market moves in 2016 due to their large reliance on long-term coal offtake contracts. Revenues were broadly flat, and net income margins held up at 14 percent. Despite slimming operational costs and PPE investment, valuations dipped slightly (overall market capitalization slipped 2 percent). We did see a vote of confidence in one ex-Top-40 player in traditional markets; Goldman Sachs and JPMorgan Chase Bank pledged \$1.5 billion in loans to bring Peabody Energy out of bankruptcy protection early this year.⁴ They may be betting that enough value resides in existing reserves to justify a rescue, despite limited growth upside.

2. PwC, International Emissions Trading Association *GHG Sentiment Survey 2016*

3. <https://www.theguardian.com/world/2016/dec/21/india-renewable-energy-paris-climate-summit-target>

4. <http://www.reuters.com/article/us-peabody-energy-bankruptcy-idUSKBN14W2XH>

Coal consumption by region



Source: <https://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2017/bp-energy-outlook-2017.pdf>

Metallurgical coal

In contrast to thermal coal, demand and pricing for metallurgical coal will remain relatively strong over the long term, as economic growth within developing markets, especially those in Asia, drive up the consumption of steel. Asia, Africa and Latin America are all considering ambitious infrastructure programs, built with steel.

Last year's rebound in the global steel market, along with the Chinese production cuts influencing the thermal coal market, drove MetCoal prices above \$300/tonne. Since then prices have proved volatile, dropping to \$140/tonne early in 2017 before bad weather in Australia pushed them back above \$300/tonne. Mergers and acquisitions have also been active over the last year. Notable transactions include Indonesian thermal coal producer Adaro's purchase of BHP's deposits in Indonesian Borneo, one of the largest undeveloped coking coal reserves in the world;⁵ and Rio Tinto's sale of its 74 percent interest in Zululand Anthracite Colliery in South Africa.⁶

Some traditional diversified miners with extensive thermal and metallurgical coal operations distanced themselves from the overall coal market in 2016. Early in the year, Anglo American announced that all coal assets would be "managed for cash generation or disposal". Although the company did not complete all the anticipated transactions (especially as coal prices rose later in the year), the broad intent to exit thermal coal in particular was clear.⁷ Similarly, Rio Tinto continued shedding Australian coal assets, a process it began in 2015.⁸

5. <http://www.reuters.com/article/us-bhp-billiton-adaro-energy-idUSKCN0YT0VA>

6. http://www.riotinto.com/media/media-releases-237_18103.aspx

7. <http://www.afr.com/business/mining/anglo-american-keeps-australian-coal-amid-backflip-20170221-gui7w7>

8. <https://www.bloomberg.com/news/articles/2017-01-24/rio-tinto-sells-australia-coal-unit-to-yancoal-for-2-45-billion>

The new energy revolution



The key factor that inhibits the widespread adoption of renewable energy is storage capacity. Recent developments in battery technology have allowed energy storage to become affordable and most importantly effective. We anticipate that the demand for clean and renewable sources of energy will further drive the demand for lithium and cobalt.

The two metals are major components in most of today's advanced batteries, which are powering electric vehicles (EVs), stationary energy storage units and portable computing devices. Demand for both lithium and cobalt is likely to keep rising as the economics of producing these batteries continues to improve. The average cost of a lithium-ion battery has decreased from \$900 per kilowatt-hour in 2010 to \$225 per kWh in 2015,¹ according to Deutsche Bank.

Average costs are expected to decrease further to \$160 per kWh in 2018. The falling cost of lithium-ion batteries is now a major factor in making EVs cost competitive with the internal combustion engine.

Lithium and cobalt are enjoying a growth story unlike any other commodity these days, driven by the global emergence of the EV market, expanding demand for high-capacity energy storage and the ubiquitous presence of ever-lighter and more powerful consumer handheld devices. Combined with a supply shortage in a market controlled by a handful of players, the price of lithium jumped more than 40 percent in the first quarter, compared with a year earlier of 2017, and the price of cobalt surged 117 percent.

Rising prices for lithium and cobalt are proving irresistible to many investors and miners, especially juniors looking to take advantage of the boom to promote their stocks after the long and painful downturn for the overall commodity sector.

But the lithium market is getting crowded, with more and more mining companies now scrambling to secure assets or bring product to market over the next five years. Cobalt, on the other hand, has attracted less attention from juniors, as most of the world's reserves lie in the Democratic Republic of Congo (DRC), a notoriously unstable market for investors.

Currently more than 61 percent of cobalt is sourced out of the DRC, produced mainly as a by-product of copper and nickel mines; only 2 percent is produced as a primary metal.² There are no major expansions or new copper or nickel mines with by-product cobalt planned to start production in the near to medium term, which essentially puts a cap on supply.

Although EVs and storage will likely drive significant new demand for lithium and cobalt for years to come, most new entrants to the field will be challenged to develop their assets or find lucrative partnerships.

A handful of dominant suppliers in each market have the power to significantly affect global prices and the resources to boost their own capacity in the next few years.

1. Welcome to the Lithium-ion age, (May 2016) Deutsche Bank Markets Research, Hocking, Matthew.
2. CRU Market Outlook – 2016 edition



Tianqi Lithium remains the only pure-play lithium producer on this year's Top 40 list, slipping in at No. 38, after entering the rankings a year earlier at No. 31. The company's shares have had a volatile ride over the last year on the Shenzhen Stock Exchange, losing as much as half their value before surging forward to a new high in early 2017.

Glencore (No. 3 on the Top 40) ranks as the world's largest miner of cobalt, a position it bolstered this year by acquiring full ownership of the Mutanda mine in the DRC. Glencore says the property has the potential to become the world's largest cobalt producer.³

Other players with significant cobalt assets include China Moly and Vale. The majority of lithium and cobalt is sold directly to chemical producers, and some of the biggest players in the chemical sector have established integrated supply chains, producing their own supplies of the two metals for their finished products.

The market capitalizations of some of these companies, including Albemarle Corporation and SQM, are large enough to merit them a place on the Top 40. But because they retain their status as primarily chemical businesses, we have not listed them in the ranking.

Several large battery companies – including Tesla Motors, Samsung and Apple – have indicated an interest in securing their own supplies of the metals, suggesting that vertical integration may be the future of the lithium and cobalt markets. For the moment, prices can swing dramatically in the absence of a transparent spot market. Trades most often involve bilateral agreements with only a small handful of suppliers, causing an illiquid market in which supply and demand fundamentals are the key drivers of price.

With batteries expected to catapult demand for lithium alone by more than 400 percent over the next four years, the technology and energy sectors will soon become the prime consumers of both metals.

Tesla Motors, more than any other single company, has been credited with driving demand for today's new generation of batteries. The upstart automaker's market capitalization has already eclipsed that of Ford, signalling just how strongly investors believe in the move to EVs.

But the effect the company will ultimately have on the market could be dwarfed by events in China, where seven mega-factories are coming online. By some estimates, these plants alone will require between 150,000 and 200,000 tonnes of new lithium at a time when there is already a shortage of supply.⁴

The cobalt market is also experiencing a shortage of supply and there are no new cobalt mines on the horizon, suggesting that prices will only continue to increase as more EVs roll off the assembly line.

3. <http://www.reuters.com/article/us-glencore-congo-idUSKBN15S1Y4>

4. <https://www.ft.com/content/4fd165d6-d274-11e6-9341-7393bb2e1b51>

The Top 40

Top 40 Companies

| Name | Country (*) | Traditional (T) v Emerging (E) | Year end | 2016 Ranking | 2015 Ranking |
|--|-----------------|-----------------------------------|----------|-----------------|-----------------|
| BHP Billiton Limited | Australia/UK | T | 30-Jun | 1 | 1 |
| Rio Tinto Limited | Australia/UK | T | 31-Dec | 2 | 2 |
| Glencore Plc | Switzerland | T | 31-Dec | 3 | 6 |
| China Shenhua Energy Company Limited | China/Hong Kong | E | 31-Dec | 4 | 3 |
| Vale S.A. | Brazil | E | 31-Dec | 5 | 8 |
| Coal India Limited | India | E | 31-Mar | 6 | 4 |
| MMC Norilsk Nickel | Russia | E | 31-Dec | 7 | 5 |
| Grupo México S.A.B. de C.V. | Mexico | T | 31-Dec | 8 | 7 |
| Anglo American plc | Uk/South Africa | T | 31-Dec | 9 | 27 |
| Freeport-McMoRan Inc. | United States | T | 31-Dec | 10 | 18 |
| Barrick Gold Corporation | Canada | T | 31-Dec | 11 | 16 |
| Newmont Mining Corporation | United States | T | 31-Dec | 12 | 15 |
| Potash Corporation of Saskatchewan Limited | Canada | T | 31-Dec | 13 | 9 |
| Polyus Gold International Limited | Russia | E | 31-Dec | 14 | 20 |
| Fortescue Metals Group Limited | Australia | T | 30-Jun | 15 | 40 |
| Saudi Arabian Mining Company (Ma'aden) | Saudi Arabia | T | 31-Dec | 16 | 10 |
| ALROSA | Russia | E | 31-Dec | 17 | New |
| Goldcorp Inc. | Canada | T | 31-Dec | 18 | 14 |
| Teck Resources Limited | Canada | T | 31-Dec | 19 | New |
| Newcrest Mining Limited | Australia | T | 30-Jun | 20 | 22 |
| Fresnillo plc | Mexico | T | 31-Dec | 21 | 19 |
| South32 Limited | Australia | T | 31-Dec | 22 | New |
| The Mosaic Company | United States | T | 31-Dec | 23 | 11 |
| Shandong Gold Mining Co., Limited | China/Hong Kong | E | 31-Dec | 24 | 38 |
| China Coal Energy Company Limited | China/Hong Kong | E | 31-Dec | 25 | 12 |
| Zijin Mining Group Company Limited | China/Hong Kong | E | 31-Dec | 26 | 13 |
| Agnico Eagle Mines Limited | Canada | T | 31-Dec | 27 | 28 |
| Antofagasta plc | United Kingdom | T | 31-Dec | 28 | 25 |
| China Molybdenum Co. Limited | China/Hong Kong | E | 31-Dec | 29 | New |
| Randgold Resources Limited | Channel Islands | T | 31-Dec | 30 | 29 |
| Sumitomo Metal Mining Co., Limited | Japan | T | 31-Mar | 31 | 23 |
| Shaanxi Coal Industry Company Limited | China/Hong Kong | E | 31-Dec | 32 | 21 |
| Jiangxi Copper Company Limited | China/Hong Kong | E | 31-Dec | 33 | 26 |
| First Quantum Minerals Limited | Canada | T | 31-Dec | 34 | New |
| China Northern Rare Earth (Group) High-Tech Co., Limited | China | E | 31-Dec | 35 | 17 |
| Zhongjin Gold Corp., Limited | China | E | 31-Dec | 36 | New |
| Yanzhou Coal Mining Company Limited | China/Hong Kong | E | 31-Dec | 37 | 34 |
| NMDC Limited | India | E | 31-Mar | 38 | 32 |
| Tianqi Lithium Industries, Inc. | China | E | 31-Dec | 39 | New |
| AngloGold Ashanti Limited | South Africa | T | 31-Dec | 40 | 30 |

We use the Top 40 companies by market capitalization at 31 December 2016 as a proxy for the performance of the mining industry. The explanatory notes here detail how we aggregate and analyze the financial information of those companies.

Notable takeaways from this year's Top 40 are as follows:

- Membership within the Top 40 did not change significantly, indicating that an element of stability returned to the industry. There were seven new entrants from the previous year, five of which had made appearances on previous rankings in either 2014 or 2015. New entrant China Moly Co., Limited joined the list after growing through acquisitions. And new arrival South32 had demerged from BHP in 2015.
- Despite a 46 percent increase in the overall market capitalization of the Top 40 compared with 2015, the threshold for entry to the ranking remained unchanged at \$4.5 billion. This discrepancy highlights a growing valuation gap between the top players and the other members.

- First Quantum and Teck Resources, two notable absentees from the 2015 Top 40, re-emerged on the 2016 list after strengthening their financial positions.
- ALROSA also re-emerged on the Top 40 list, landing at No. 17, thanks in part to the increase in the value of the Russian ruble relative to the US dollar.
- Top movers in the ranking included Fortescue Metals, up from the bottom to No. 15, and Anglo American, which climbed to ninth spot, up from No. 27. Both companies reduced their long-term debt balances during the year.
- Notable absentees from the Top 40 include Kinross Gold and Lundin Mining. Both have large cash balances and have indicated they are looking to either make acquisitions or enhance internal growth opportunities in 2017.
- The number of Chinese companies on the Top 40 decreased marginally to 11 from 12 a year earlier. All of those remaining are now in the bottom half of the ranking, with the exception of China Shenhua Energy, which sits at No. 4. While we do not expect a significant placement shift in traditional and emerging companies in 2017 there are a number of Chinese companies still on stand by.
- Diversified and gold companies continued to dominate the Top 40, increasing their weighting to more than half.
- The split of traditional and emerging companies remained relatively consistent, with a small drop in the latter to 17, down from 19 a year earlier.



Financial analysis

Income Statement

| \$ billion | 2016 | 2015 | Change (%) |
|---|------------|-------------|--------------|
| Revenue | 496 | 491 | 1% |
| Operating expenses | (375) | (378) | -1% |
| Other operating expenses | (15) | (22) | -32% |
| Adjusted EBITDA | 105 | 92 | 14% |
| Impairment charges | (19) | (56) | -66% |
| Depreciation and amortisation | (44) | (45) | -2% |
| Net finance cost | (9) | (18) | -50% |
| PBT | 34 | (28) | -221% |
| Income tax expense | (15) | (5) | 200% |
| Net profit | 20 | (33) | -161% |
| Net profit less impairment | 39 | 23 | 70% |
| Effective tax rate | 44% | -18% | |
| Equity | 488 | 470 | 4% |
| Capital employed | 648 | 747 | -13% |
| Key Ratios | | | |
| Adjusted EBITDA margin | 21% | 19% | |
| Net profit margin | 4% | -7% | |
| Return on capital employed | 3% | -4% | |
| Return on equity | 4% | -7% | |
| Return on capital employed excluding impairment | 6% | 3% | |

Miners managed to turn the historical aggregate net loss in 2015 into a profit, driven by lower impairment charges, and a decrease in interest expenses after key players cleaned up their balance sheets.

Revenue from the Top 40 remained relatively flat – up just 1 percent from the previous year’s sum of \$491 billion – despite a rebound in commodity prices, specifically coal and iron ore in the second half of the year. Coal revenue declined by 4 percent while iron ore increased by 2 percent.

This disconnect is as a result of differences in reporting as revenue from six of the Top 40 does not include the impact of the last half year’s price recoveries enjoyed by the rest of the Top 40. This further highlights the volatility experienced by the commodities market in 2016, confirming the incomparability of the first and second half of the year.



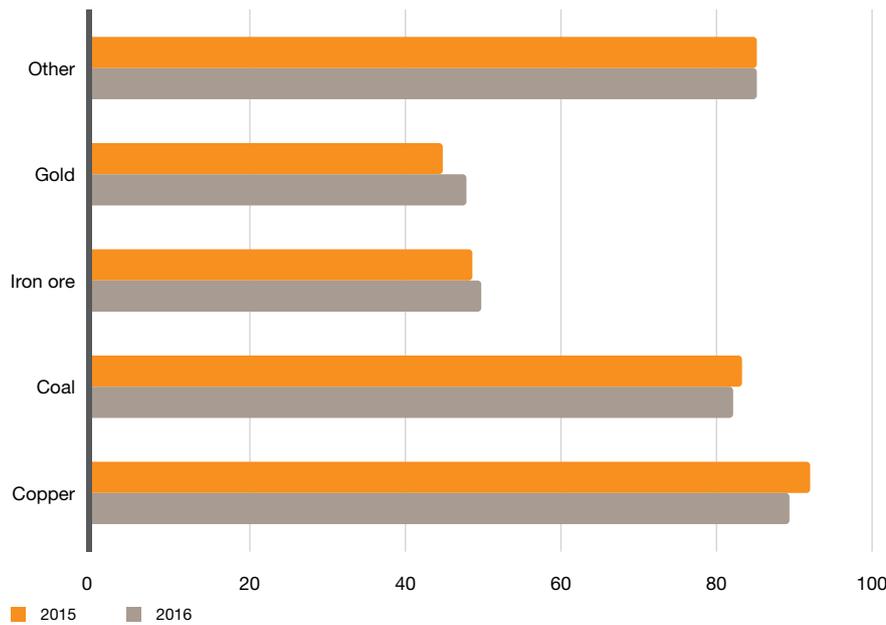


EBITDA 2016
\$107 billion

VS

EBITDA 2015
\$92 billion

Revenue by commodity (\$ billion)



Source: PwC Analysis

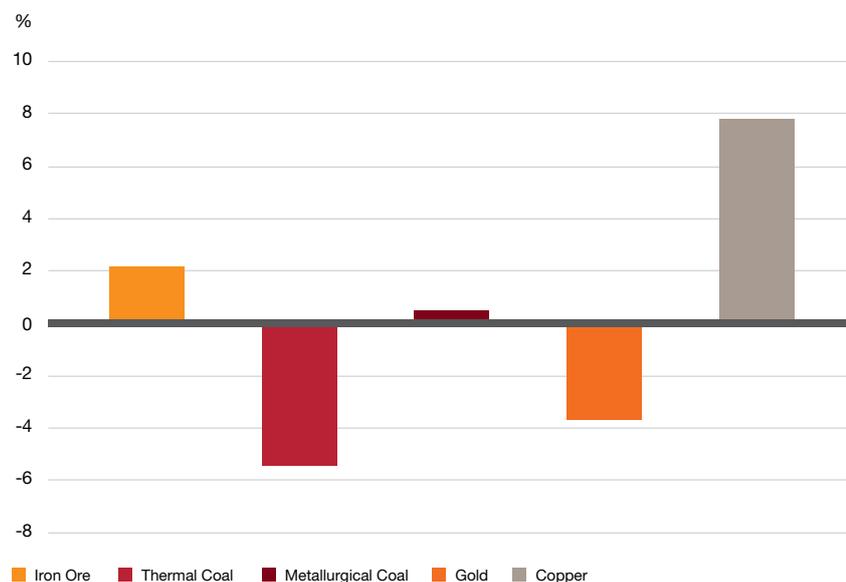
To illustrate the impact of the commodity price during 2016, we adjusted Top 40 revenue for differences in year ends for the key players, resulting in an overall revenue increase by about 12% from the prior year.

In their 2017 half year results, BHP, being a key contributor to coal and iron ore in the Top 40, reported phenomenal results boosted mainly by commodity prices, consistent with the rest of the industry.

Production

Keeping up with the theme of resilience, miners continued to challenge themselves to employ optimal production measures while actively seeking to contain costs. Overall, production numbers remained relatively flat from 2015, with increases in production in some commodities being absorbed by the dispirited performance of others.

Production by key commodity



Source: PwC Analysis

Although not at the levels we saw last year, iron ore producers continued on their positive streak, increasing production by 2 percent in 2016.

The nearly flat production figures are further confirmation of a lack of significant expansionary capital into the industry, a continuation of the trend seen in 2015. The future of the industry however is largely dependent whether miners are able to get out of survival mode and insightfully seek growth opportunities, having learned from history.

With production values remaining relatively flat from prior year, the industry owes much of the overall stability of the revenue figures on the strong rebound in key commodities prices experienced in the second half of 2016.

Costs

In an effort to counter the impact of the industry downturn experienced in late 2015 and continuing in 2016, miners embarked on widespread efforts to cut costs by implementing more efficient production methods to lower controllable input costs. The results thereof were clearly seen in 2015, with the Top 40 reporting a 17% decrease in operating costs against higher production volumes in the prior year.

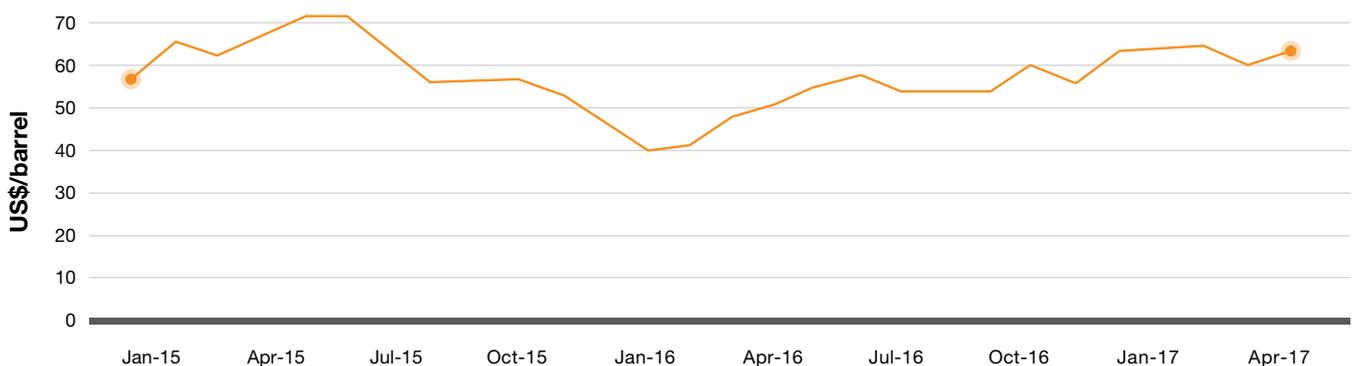


At face value, 2016 operating cost results do not necessarily paint the same impressive picture as 2017. Overall, production figures marginally decreased from 2015 volumes (1%) with expenses from ordinary activities following the same trend and declining by only 1%.

Although the impact thereof cannot be quantified relative to successes achieved for the Top 40 as a whole, from announcements made by the miners, we know that cost initiatives are still in full swing. Notable player Rio Tinto recently exceeding its cost cutting target.

Having announced plans to reduce cash costs by \$1 billion in 2015, Rio Tinto was able to exceed this target by \$600 million in 2016, despite externalities such as the steady recovery of crude (see graph below). In their results, BHP announced a reduction in controllable cash costs of US\$1.4 billion for F16. Input costs (including staff costs) were kept controlled and overall, the Top 40 reported a decrease of around 8 percent.

Crude oil, monthly average



Source: PwC Analysis



Balance sheet

Working capital levels consistent

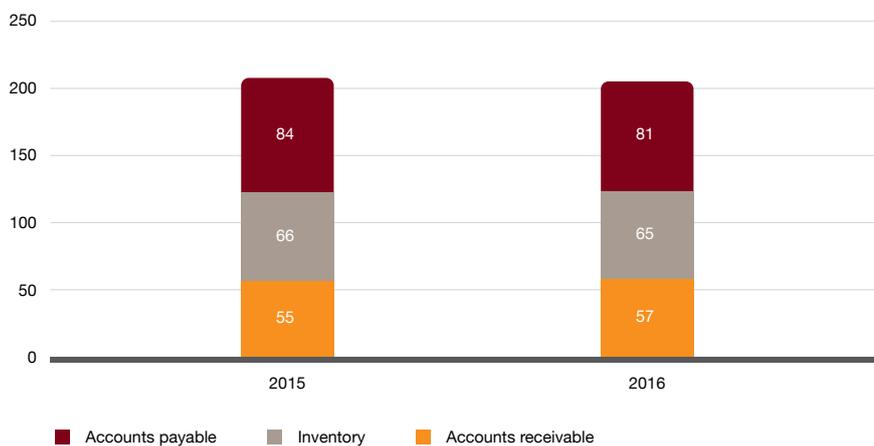
Working capital levels remained broadly consistent year-over-year, thanks to several years of rigorous working capital reduction programs by the Top 40. The move has freed up cash for companies, but it appears that the industry does not have much room left to cut additional working capital.

| \$ billion | FY2016 | FY2015 | Change (%) |
|---|--------------|--------------|---------------|
| Current assets | | | |
| Cash | 86 | 82 | 4.9% |
| Inventories | 65 | 67 | (3.0%) |
| Accounts receivable | 57 | 55 | 3.6% |
| Other | 39 | 37 | 5.4% |
| Total current assets | 247 | 241 | 2.5% |
| Non-current assets | | | |
| Investment in associates and joint ventures | 49 | 48 | 2.1% |
| Property, plant and equipment | 616 | 632 | (2.5%) |
| Goodwill and other intangibles | 59 | 55 | 7.3% |
| Other investments and loans granted | 15 | 15 | 0.0% |
| Other | 77 | 88 | (12.5%) |
| Total non-current assets | 816 | 838 | (2.6%) |
| Total assets | 1,063 | 1,079 | (1.5%) |
| Current liabilities | | | |
| Accounts payable | 81 | 84 | (3.6%) |
| Borrowings | 43 | 48 | (10.4%) |
| Other | 50 | 40 | 25.0% |
| Total current liabilities | 174 | 172 | 1.2% |
| Non-current liabilities | | | |
| Borrowings | 245 | 273 | (10.3%) |
| Other | 144 | 136 | 5.9% |
| Total non-current liabilities | 389 | 409 | (4.9%) |
| Total equity | 491 | 505 | (2.2%) |
| Total equity & liabilities | 1,054 | 1,083 | (2.7%) |

| Key ratios | FY2016 | FY2015 |
|---------------------------------|--------|--------|
| Gearing ratio | 41% | 48% |
| Current ratio | 1.42 | 1.40 |
| Quick ratio (times) | 1.05 | 1.01 |
| Net debt (borrowings less cash) | 202 | 239 |
| Net debt to EBITDA | 1.91 | 2.62 |
| Cash to cash cycle (days) | 25 | 12 |
| Net working capital | 73 | 69 |

| | FY 16 (\$ billions) | FY15 (\$ billions) |
|---|---------------------|--------------------|
| Accounts receivable | 57 | 55 |
| Day Sales Outstanding (DSO – days) | 41 | 41 |
| Inventory | 65 | 66 |
| Days Inventory Outstanding (DIO – days) | 64 | 56 |
| Accounts payable | 81 | 84 |
| Days Payable Outstanding (DPO – days) | 80 | 77 |
| Net working capital | 73 | 69 |
| Working capital ratio | 15% | 13% |

Working capital changes



Source: PwC Analysis

Decrease in net borrowings

Borrowings by the Top 40 decreased \$33 billion in 2016, which is consistent with plans announced last year by Glencore, Freeport and Barrick. This was composed mainly of long-term borrowing reductions (\$28 billion). Given an increase in cash balances of \$4 billion, Net Borrowings (Borrowings less cash) fell by \$36 billion. This applied across both Traditional and Emerging companies.

The Top 40 had many reasons for trimming their debt levels. The most commonly reported include:

- To strengthen the balance sheet;
- To focus on capital allocation.

Three companies bucked the debt reduction trend:

- BHP added \$5.3 billion,
- Polyus Gold International Limited added \$2.8 billion,
- Saudi Arabian Mining Company added \$2.9 billion.

Improved gearing ratios

The continuing focus on debt repayments resulted in an improved gearing ratio of 41 percent in 2016 compared with a record high in the prior year of 48 percent. The ratio was 42 percent among traditional companies and 34 percent among emerging companies.

This compares with ratios of 50 percent and 42 percent, respectively, in 2015.

Although the debt levels are improving, there are still three companies with gearing ratios of approximately 100 percent. These include Saudi Arabian at 138 percent, Freeport at 127 percent and MMC Norilsk Nickel (MMC) at 117 percent. This picture, however looks brighter than the one in 2015 where MMC was at 186 percent and Freeport at 157 percent.

Net borrowings to EBITDA coming down

Net debt to EBITDA ratios decreased to 1.91, down from the peak in the prior year of 2.60. This decline resulted from a reduction of net borrowings by 15 percent year over year and the increase of EBITDA by 16 percent year over year.

Similar to the prior year, there were twelve companies with a net debt to EBITDA ratio greater than 12. EBITDA fell for all of them, but nine of the twelve companies did manage to reduce their net debt.

Cash flows

| \$ billion | 2016 | 2015 | Change |
|--|-------------|-------------|-------------|
| Cash flow relating to operating activities | | | |
| Cash generated from operations | 114 | 124 | -8% |
| Income taxes (paid)/refunded | (13) | (19) | -32% |
| Other | (12) | (9) | 33% |
| Net operating cash flows | 89 | 96 | -7% |
| Cash flow related to investing activities | | | |
| Purchases of property, plant and equipment | (49) | (83) | -41% |
| Purchase of investments excluding controlled entities including | (1) | (3) | -67% |
| Purchases of, or increased investment in, controlled entities | (2) | (1) | 100% |
| Exploration expenditure* | - | - | 0% |
| Proceeds from sale of property, plant and equipment | 8 | 2 | 300% |
| Proceeds from sale of investments | 14 | 8 | 75% |
| Other | (10) | (5) | 100% |
| Net investing cash flows | (40) | (82) | -51% |
| Cash flow related to financing activities | | | |
| Dividends paid | (16) | (29) | -45% |
| Share buy backs | (4) | (6) | -33% |
| Proceeds from borrowings | 71 | 72 | -1% |
| Repayment of borrowings | (93) | (73) | 27% |
| Share issuances | 3 | 22 | -86% |
| Other | (5) | (4) | 25% |
| Net financing cash flows | (44) | (18) | 144% |
| Net movement in cash and cash equivalents | 5 | (4) | -225% |
| Cash and cash equivalents at beginning of the year | 82 | 86 | -5% |
| Effect of foreign currency exchange rate on cash and cash equivalent | (1) | (0) | 403% |
| Cash and cash equivalents at end of the year | 86 | 82 | 5% |
| Free cash flows | 40 | 13 | 208% |

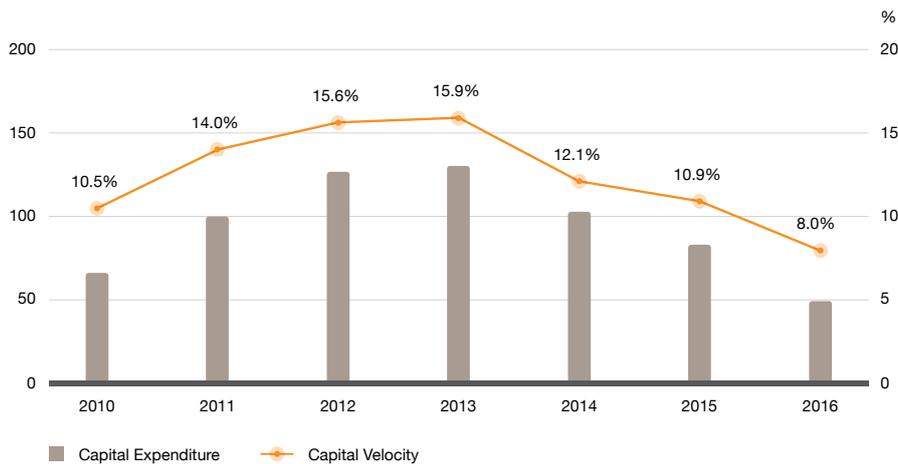
Positive free cash flow

Operating cash flows decreased to \$114 billion, from \$124 billion. However, two outliers drove the results: BHP and Glencore. As discussed in the Revenue section, BHP's results reflected the reporting lag (BHP has a June 30 year-end). Most other companies saw their Operating Cash Flow rise following higher commodity prices and cost control.

Cut back on capital expenditures

Investment in property, plant and equipment declined to \$49 billion down from \$83 billion the prior year. This reduction follows earlier announcements that companies were going to focus on their core assets and streamline their operations. In all, acquisitions were down as well as the development of properties.

Top 40 Capital Velocity compared to capital expenditure (\$ billion)



Source: PwC Analysis

Borrowings

Debt repayments for the Top 40 amounted to \$93 billion in 2016, up from \$73 billion the previous year.

Most of the debt that was issued is being used for refinancing, rather than for acquisitions or property development.

Dividends down to a trickle

As predicted in the previous *Mine*, overall dividend payments by the Top 40 remained under pressure for 2016 as companies focused on paying back debt. Dividend payments declined by 45 percent from \$29 billion to \$16 billion.

Several companies that paid dividends in 2015 stopped paying the distribution in 2016, including Glencore and Anglo. The marked decrease in dividends is expected with the focus on repayment of debt.

Shares issuance

Share issuances decreased dramatically in 2016 to just \$2.3 billion, down from \$22 billion a year earlier. However, the 2015 amount included the issuance of \$14.4 billion worth of shares by South32 upon demerging from BHP which accounted for 65 percent of the share issuances.



10 year trend

| \$ billion | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 | 2009 | 2008 | 2007 | 2006 |
|---|--------|--------|-------|-------|-------|------|------|-------|-------|------|------|
| Aggregate market capitalisation | 714 | 494 | 783 | 958 | 1234 | 1202 | 1605 | 1259 | 563 | 1481 | 962 |
| Aggregated income statement | | | | | | | | | | | |
| Revenue | 353 | 354 | 500 | 512 | 525 | 539 | 435 | 325 | 349 | 312 | 249 |
| Operating expenses | -251 | -390 | -359 | -350 | -340 | -311 | -246 | -217 | -208 | -176 | -141 |
| EBITDA | 102 | -36 | 141 | 162 | 185 | 228 | 189 | 108 | 141 | 136 | 108 |
| Amortisation, depreciation and impairment | -63 | -101 | -63 | -97 | -86 | -42 | -34 | -31 | -57 | -19 | -12 |
| PBIT | 39 | -137 | 78 | 65 | 99 | 186 | 155 | 77 | 84 | 117 | 96 |
| Net finance cost | -9 | -18 | -14 | -15 | -6 | -6 | -7 | -6 | -6 | -5 | -3 |
| PBT | 30 | -155 | 64 | 50 | 93 | 180 | 148 | 71 | 78 | 112 | 93 |
| Income tax expense | -15 | -5 | -22 | -30 | -25 | -48 | -38 | -22 | -21 | -32 | -27 |
| Net profit | 15 | -160 | 42 | 20 | 68 | 132 | 110 | 49 | 57 | 80 | 66 |
| Adjusted net profit excl. impairment | 30 | -1 | 74 | 43 | 111 | 147 | 112 | 60 | 88 | 82 | 66 |
| Year on year increase/ (decrease) in revenue | (0%) | (29%) | (2%) | (2%) | (3%) | 24% | 34% | (7%) | 12% | 25% | 12% |
| Year on year increase/ (decrease) in EBITDA | (383%) | (126%) | (13%) | (12%) | (19%) | 21% | 75% | (23%) | 4% | 26% | 33% |
| Year on year increase/ (decrease) in net profit | 109% | (481%) | 110% | (71%) | (48%) | 20% | 124% | (14%) | (29%) | 21% | 47% |
| EBITDA margin | 29% | (10%) | 28% | 32% | 35% | 42% | 43% | 33% | 40% | 44% | 43% |
| Aggregated cash flow statement | | | | | | | | | | | |
| Operating activities | 89 | 96 | 118 | 124 | 137 | 174 | 137 | 83 | 104 | 95 | 77 |
| Investing activities | -40 | -83 | -87 | -125 | -169 | -142 | -79 | -74 | -102 | -126 | -67 |
| Financing activities | -44 | -18 | -27 | -3 | 21 | -28 | -35 | 10 | 14 | 36 | 4 |
| Free cash flow | 40 | 13 | 27 | -6 | 11 | 76 | 70 | 19 | 38 | 44 | 40 |
| Aggregated balance sheet | | | | | | | | | | | |
| Property, plant and equipment | 616 | 631 | 650 | 712 | 701 | 601 | 511 | 467 | 402 | 371 | 262 |
| Other assets | 447 | 444 | 535 | 544 | 544 | 538 | 432 | 334 | 274 | 284 | 192 |
| Total assets | 1063 | 1075 | 1185 | 1256 | 1245 | 1139 | 943 | 801 | 676 | 655 | 454 |
| Total liabilities | 563 | 578 | 610 | 624 | 563 | 482 | 387 | 354 | 339 | 329 | 217 |
| Total equity | 491 | 492 | 575 | 632 | 682 | 657 | 556 | 447 | 337 | 326 | 237 |

Note: All income statement data presented excludes Glencore marketing and trading revenue and costs.

Note: The information included above includes the aggregated results of the Top 40 Mining companies as reported in each respective edition of *Mine*, except for 2014, which uses the current year's Top 40's financial comparative financial results.

Glossary

| Terms | Definition |
|--|---|
| Adjusted net profit | Net profit excluding impairments |
| Capital employed | Property plant and equipment plus current assets less current liabilities |
| Capital expenditure | Purchases of property, plant and equipment |
| Capital velocity | Ratio of capital expenditure to capital employed |
| CEO | Chief Executive Officer |
| Cash to cash cycle | Days inventory outstanding plus days sales outstanding less days payables outstanding |
| Current ratio | Current assets/current liabilities |
| CFR spot Australia | Cost and freight spot price from Australia |
| DIO | Days Inventory Outstanding |
| DSO | Days Sales Outstanding |
| DPO | Days Payable Outstanding |
| EBIT | Earnings before interest and tax |
| EBITDA | Earnings before interest, tax, depreciation, amortisation, and impairments |
| EBITDA margin | EBITDA/revenue |
| Emerging miners/markets and companies | Referring to Top 40 companies that are operated from Brasil, Russia, India and China |
| ETR | Effective tax rate |
| Free cash flow | Operating cash flows less investment in property, plant and equipment |
| GDP | Gross Domestic Product |
| Gearing ratio | Net borrowings/equity |
| IMF | International Monetary Fund |
| M&A | Mergers and Acquisitions |
| Market capitalisation | The market value of the equity of a company, calculated as the share price multiplied by the number of shares outstanding |
| Net assets | Total assets less total liabilities |
| Net assets ratio | Total assets/total liabilities |
| Net Asset Value (NAV) | Net asset value based on analyst consensus estimates (not the net assets derived from the financial statements) |
| Net borrowings | Borrowings less cash |
| Net profit margin | Net profit/revenue |
| NPV | Net present value |
| PBIT | Profit before interest and tax |
| PBT | Profit before tax |
| Price-to-earnings ratio (PE ratio) | Market value per share/earnings per share |
| Quick ratio | (Current assets less inventory)/current liabilities |
| Return on capital employed (ROCE) | Net profit excluding impairment/property, plant and equipment plus current assets less current liabilities |
| Return on equity (ROE) | Net profit/equity |
| Top 40 | 40 of the world's largest mining companies by market capitalisation as of 31 December 2016 |
| Traditional miners/markets and companies | All of the companies included in the Top 40 that are not Emerging |
| Working capital | Current assets less current liabilities |

Explanatory notes to the financial analysis

We have analyzed 40 of the largest listed mining companies by market capitalization. Our analysis includes major companies in all parts of the world whose primary business is assessed to be mining. The results aggregated in this report have been sourced from the latest publicly available information, primarily annual reports and financial reports available to shareholders.

Where 2016 information was unavailable at the time of data collation, these companies have been excluded. Companies have different year-ends and report under different accounting regimes, including International Financial Reporting Standards (IFRS), United States Generally Accepted Accounting Principles (US GAAP) and others.

Information has been aggregated for the financial years of individual companies and no adjustments have been made to take into account different reporting requirements and year-ends. As such, the financial information shown for 2016 covers reporting periods from April 1, 2015 to December 31, 2016, with each company's results included for the 12-month financial reporting period that falls within this period. All figures in this publication are reported in US Dollars, except when specifically stated. The results of companies that report in currencies other than the US Dollar have been translated at the closing US Dollar exchange rate for the respective year.

Some diversified undertake part of their activities outside the mining industry, such as the oil and gas businesses of BHP and Freeport, parts of the Rio Tinto aluminium business and Glencore's marketing and trading revenues and costs. No attempt has been made to exclude such non-mining activities from the aggregated financial information, except where noted.

Where the primary business is outside the mining industry, such as Boliden AB where more than 95% of external revenues are from smelting activities, they have been excluded from the Top 40 listing.

All streamers such as Franco Nevada and Silver Wheaton have been excluded from the Top 40 list.

Entities that are controlled by others in the Top 40 and consolidated into their results have been excluded, even when minority stakes are listed.

Financial reporting

1 April 2015

31 December 2016

The financial information shown for 2016 covers reporting periods from 1 April 2015 to 31 December 2016, with each company's results included for the 12-month financial reporting period that falls within this period

Key contributors to Mine 2017



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Let's continue the conversation

For a deeper discussion please contact one of our regional leaders or your local PwC partner:

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