Congreso Nacional de Minería

Retos y Riesgos Globales de la Minería 2017

Mayo 10, 2017

EY
Building a better working world

Mining sector globally … and locally!

Mining Sector Globally

“The only thing constant is volatility”

Is not about Crisis … is about Volatility …

Contexto Sector y realidades Colombia …

… a inicios de 2016, el oro inicia recuperación de caídas a históricos de 2010 … hoy es visto como medida de inversion y protección … y los precious siguen mejorando …

... En 2015 el PIB Minero decreció 2.3%, en 2016 subió 4.7% … en 2017 se proyecta 5%, con crecimiento del 20% …

… sin embargo, la inversion extranjera en años anteriores era de USD2.500 millones … y en 2016 el flujo fue negativo …

… la producción de oro alcanzó 2 millones de onzas … y solo el 13% corresponde a producción legal ..

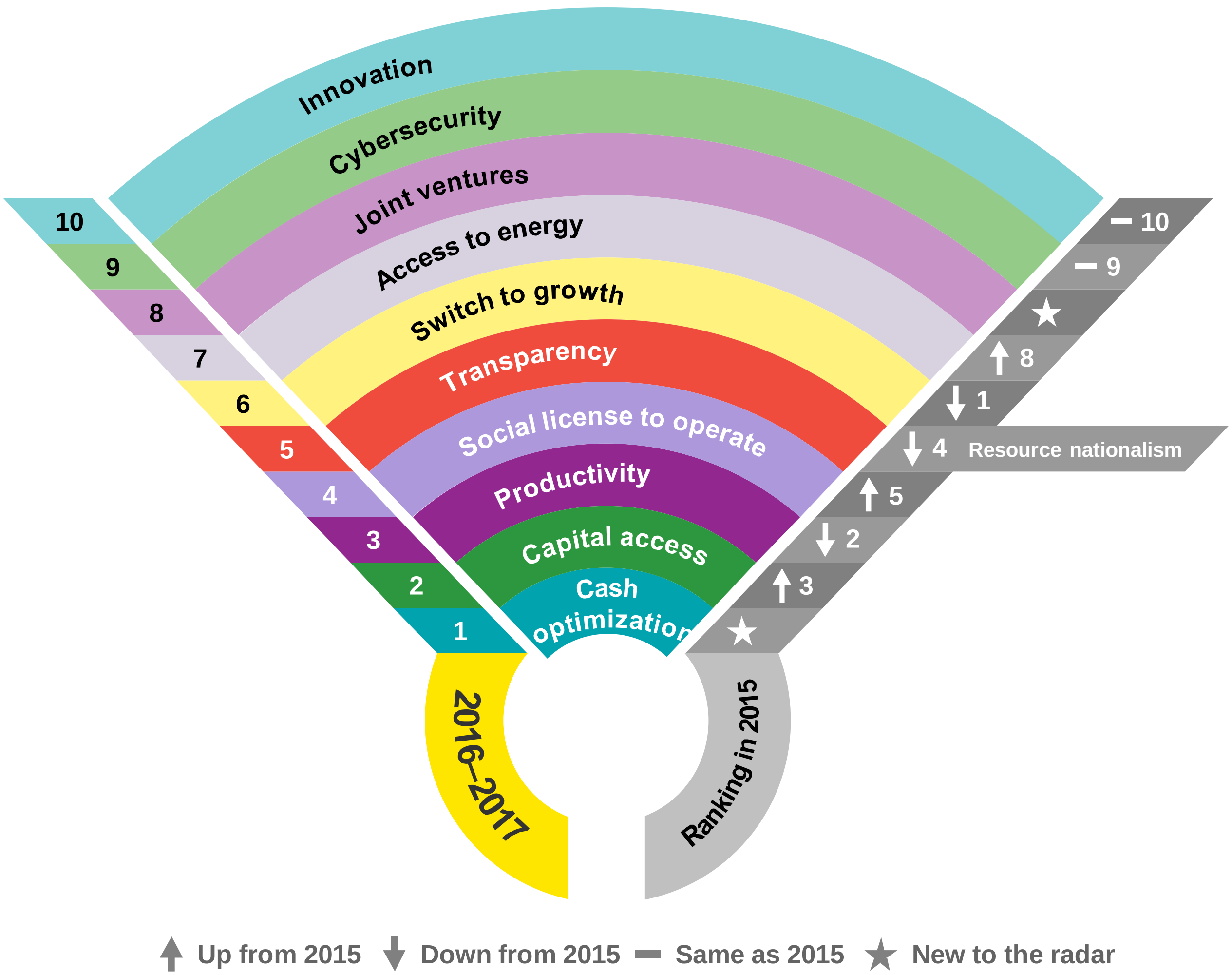
… Hasta hace poco Colombia era catalogado como de atractivo alto y medio alto de inversion … y hoy lo piensan más de dos veces antes de invertir …

… las monedas suben y bajan … no sólo el peso colombiano …

… los rezagos del súper ciclo se mantienen … altos costos, baja demanda, impacto en precios …

Retos y riesgos en Minería 2017

Perspectiva EY



Building a better working world

Outlook en los últimos años…

Top 10 risks 2016-2017		Over 9 years 2008 (peak of the super cycle)	
01	Cash optimization	01	Skills shortage
02	Capital access	02	Industry consolidation
03	Productivity	03	Infrastructure access
04	Social license to operate	04	Social license to operate
05	Transparency	05	Climate change
06	Switch to growth	06	Rising costs
07	Access to energy	07	Pipeline shrinkage
08	Joint ventures	08	Resource nationalism
09	Cybersecurity	09	Access to energy
10	Innovation	10	Increased regulation

En particular para cada commodity …

Retos y riesgos en Minería 2017
Perspectiva EY

Estudio Global EY

Percepción del Sector en Colombia*

Factores críticos que impactan la percepción:

- Incertidumbre jurídica
- Coordinación institucional
- Informalidad e ilegalidad
- Protestas y relaciones con la comunidad
- Recursos especializados limitados
- Limitaciones logísticas, de infraestructura y seguridad

** No exhaustivo, basado en conversaciones con Compañías, Instituciones y Academia en Colombia, e interpretación de noticias de actualidad*

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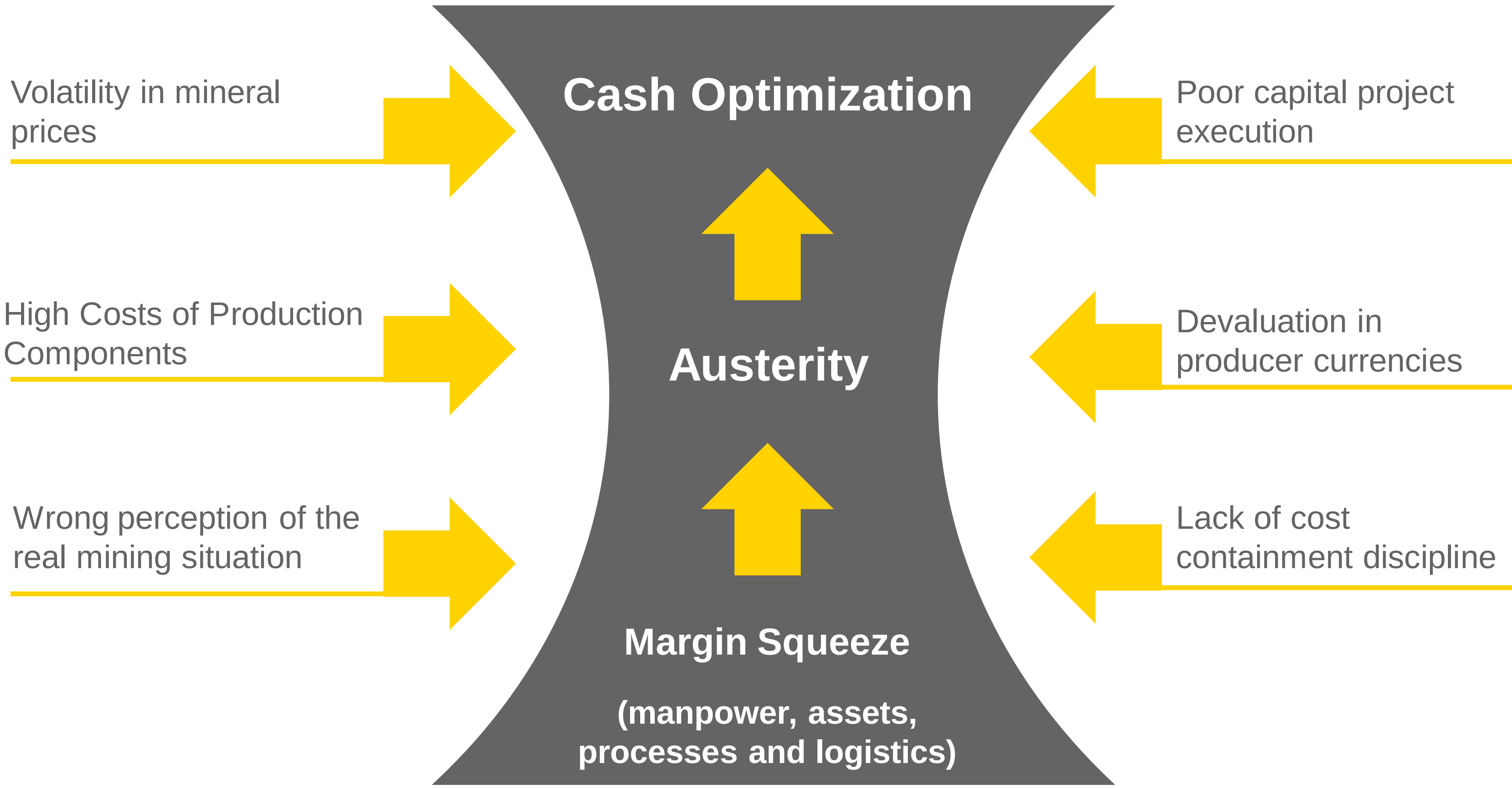
Ahora … hacia dónde se están enfocando los esfuerzos a nivel global y local para mitigar los impactos de esos retos y riesgos de sector?

Cash optimization

Industry margins are hit by a number of factors

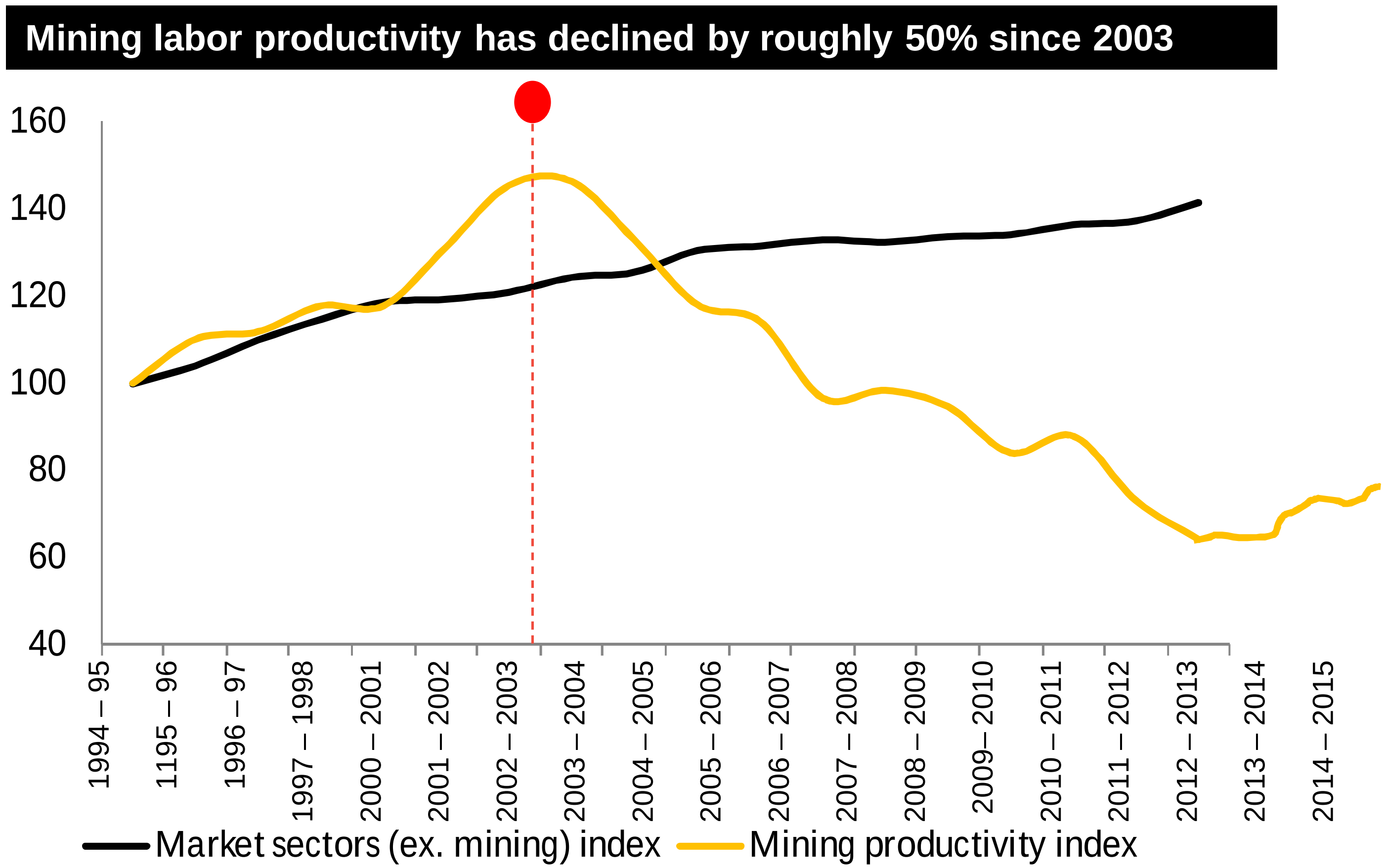


“2017 is about switch to growth … the austerity mode can leave us behind …”

Top 10 mining companies

Productivity

Systematic end-to-end transformation



Source: Australian Bureau of Statistics

What companies are doing …

During super cycle, productivity fell to its lowest rate in more than 30 years …

Key thought

To achieve real productivity gains, the entire leadership team will need to be engaged and behind transformational change.

"Higher volumes across most of the portfolio, with cash costs down 2% in real terms."
Anglo American

- Tax efficient supply chain
- Inbound logistics review
- Operational Improvement
- Operational efficiency in labour, equipment and technology
- Strategic sourcing

"We embedded productivity-led volume and cost efficiencies of US$2.9 billion, exceeding our target by 61%"
BHP Billiton

- Inter-productive Value Chains
- Capability Modelling
- Mining scenario modelling
- Transportation network optimisation
- Internet of the things and Advanced Data Analytics
- Product recovery model

"Over the past two years, we've released US$2.1 billion of working capital."
Rio Tinto

"Alcoa has reduced average days working capital by 9 days since 2009."
Alcoa

"We are freeing up working capital by reducing inventories."
Barrick Gold

Procurement and sourcing from enterprise intelligence

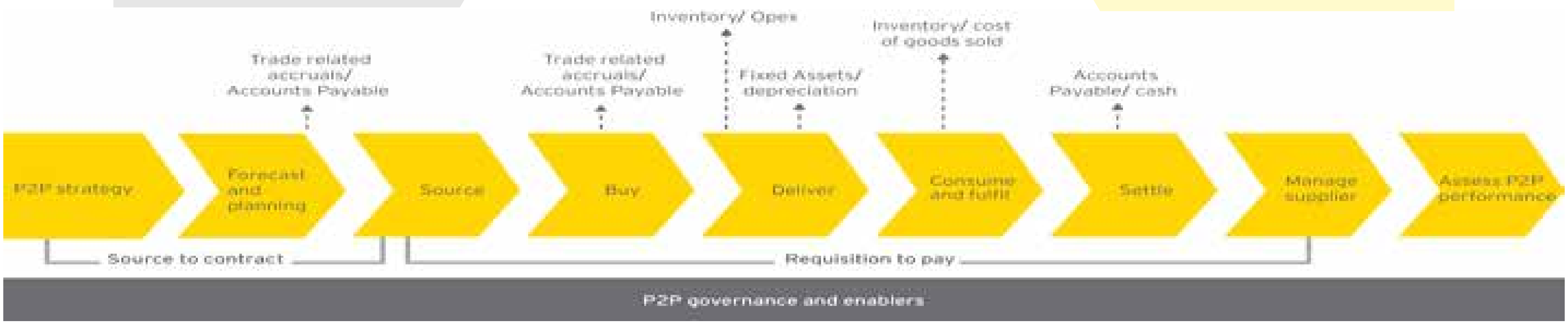
What companies are doing …

Strengthening the Risk Management perspective

- Building a strong platform for continuous business improvement and growth … not focus in baseline risks, but incorporating the holistic risk radar …

- § **Productivity and Efficiency**
- § **Processes and Controls**
- § **Data and Information Management**
- § **Organizational structure and capabilities**
- § **Technology and Operational tools**

- § **Responsible Mining**
- § **Regulatory compliance**
- § **Responsible supply chain and human rights**
- § **Labor rights and work conditions**
- § **Business Partners and Third Parties**



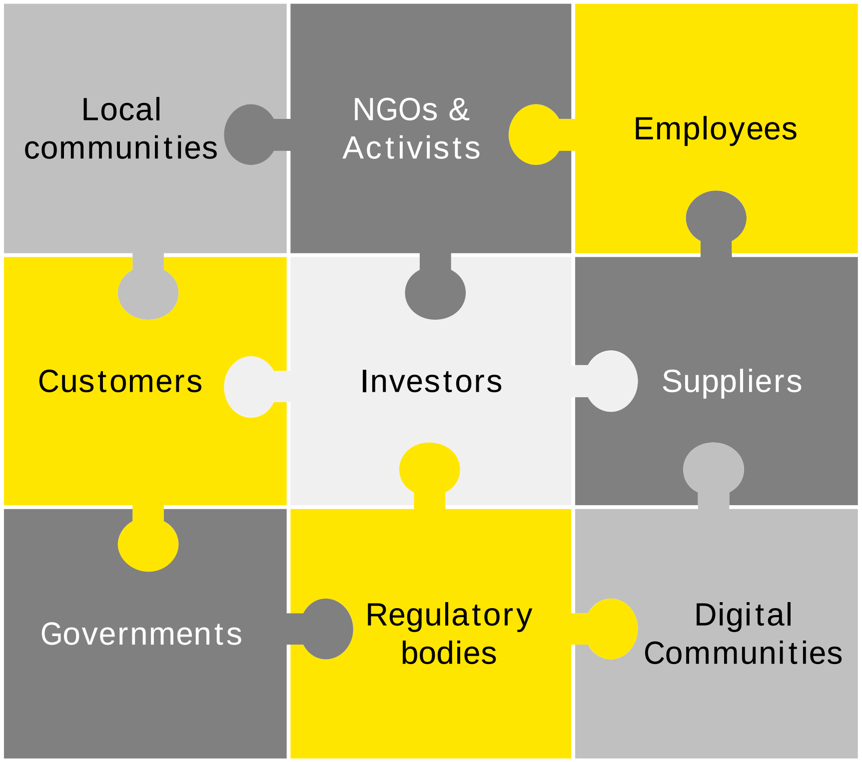
Social license to operate

Local case:

- Informality and Illegal Operations
- Community Protests
- Competition between extraction and traditional production activities
- Potential environmental impacts due to close operations on water sources

Response:

- Focus on relationships with all stakeholders
- Inter-productive value chains with community
- Active and visible Formalization Programs
- Pro-activity with planning so prepared to deal with new issues



"Social concerns about impacts are beginning to lead to increased regulation"

Top 10 mining company

Regulation & Transparency

Requirements keep increasing

Top Issues

- **#1** Higher Institutional Capacity
- **#2** Lack of coordination, policies, procedures, information
- **#3** High Government Take
- **#4** Ownership of land & POT
- **#5** Judgement decisions
- **#6** Peace process is still a big question
- **#7** Infrastructure and concessions speed
- **#8** Treatment and involvement on solving illegal operations

How the local mining environment can respond on this global and local challenges?

The better the question.
The better the answer.
The better the world works.

Our independent perspective on the local case …

- There is a general feeling of uncertainty … however the medium term looks positive
- Due to great geological mining potential, Colombia is still in the investment global radar
- Great scale projects are on the way to be successful … this is the only way to attract investment
- National commitment is not only about short term policies … investment attraction requires long term programs

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Top 10 business risks facing mining and metals, 2016–2017

EY

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"The market environment of prices being lower for longer, economic uncertainty and volatility are all reflected in our ranking of the top risks facing the sector for 2016–2017."

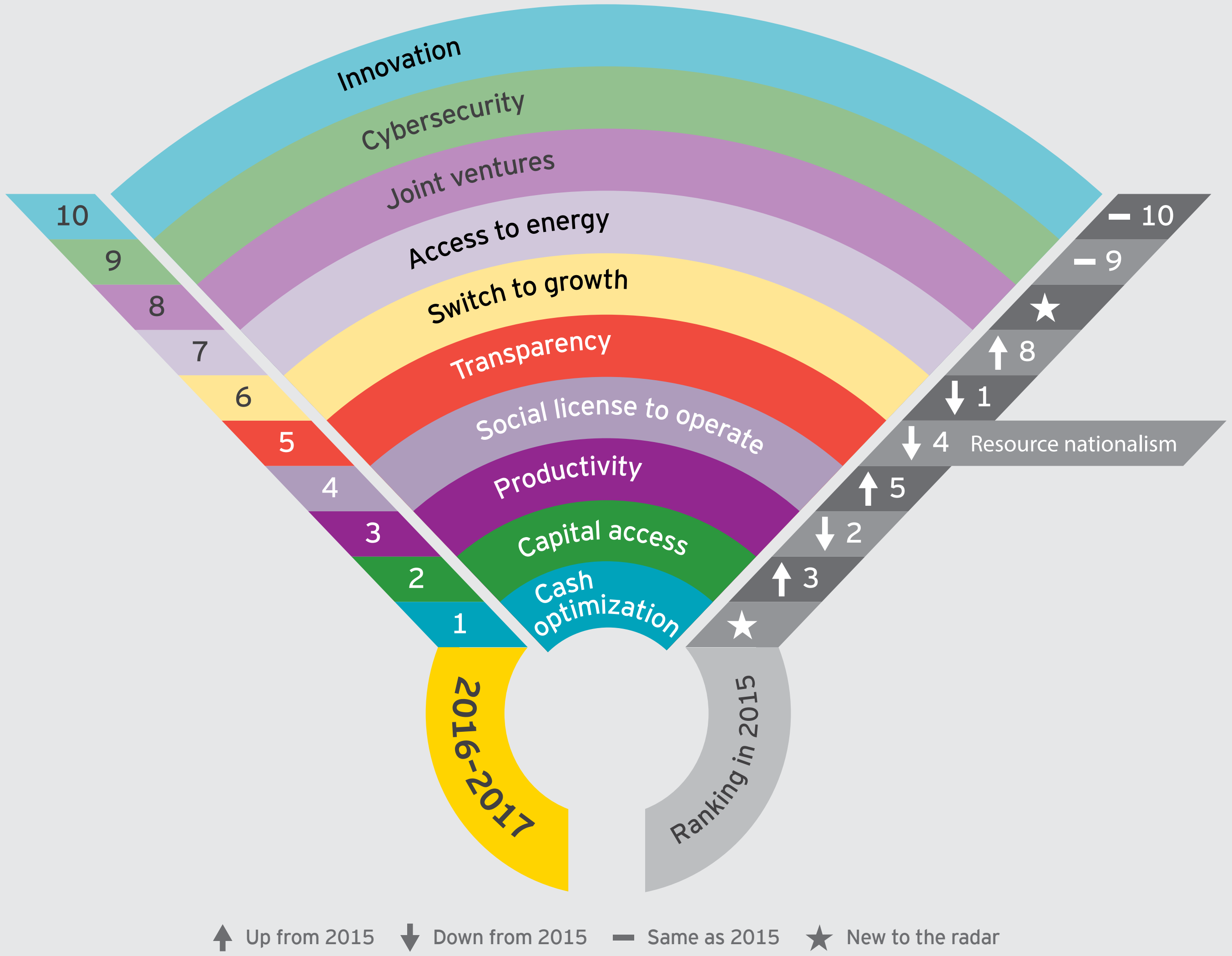
Miguel Zweig,
EY Global Mining & Metals Leader

Video insight

EY's **Miguel Zweig**, Global Mining & Metals Leader, explains the rankings of the key risks.

Risk radar for mining and metals

Top 10 business risks



Executive summary

Mining and metals companies have increased their focus on cash as they seek to maintain strong balance sheets and plan for longer-term profitability. For this reason, **cash optimization** is the No. 1 risk facing mining and metals companies in 2016-2017, especially given the limited demand and pricing visibility in the wake of market volatility. Cash optimization encompasses the risk of price and currency volatility, which was ranked No. 6 in 2015-2016.

In the current environment, securing funding and credit terms has been particularly challenging. **Capital access** has moved up to No. 2 as trade and debt financing is extended only to those companies with sufficient security and at an increased cost, as banks seek to manage the risk of default.

Productivity remains in the top three risks as many miners are still struggling to make further improvements, particularly in asset productivity. We believe that companies need to embed sustainable loss-elimination practices through employee engagement, plus an integrated end-to-end approach for long-term productivity improvement.

Moving out of the top 10 this year is **capital projects**, given investment in new projects has slowed.

Our 2015-2016 No. 1 risk, "switch to growth," has moved down to No. 6 as other risks have increased in criticality. With the next upturn in commodity prices expected to be some way off, it has decreased in urgency. Nonetheless, mining and metals companies that focus on having a productive, well-managed and cost-effective end-to-end value chain, supported by a change in organizational mindset, will be best-positioned for growth in the next cyclical upswing.

Top 10 risks

	2016-2017
01	Cash optimization
02	Capital access
03	Productivity
04	Social license to operate
05	Transparency
06	Switch to growth
07	Access to energy
08	Joint ventures
09	Cybersecurity
10	Innovation

Over 9 years

	2008 (peak of the super cycle)
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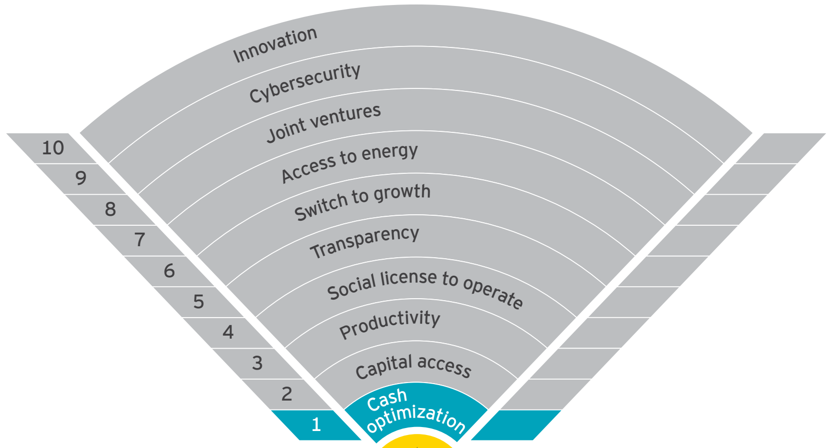


01

Cash optimization

Key thought

Cash generation and preservation will remain a key focus for the medium term due to ongoing market volatility.

(New)

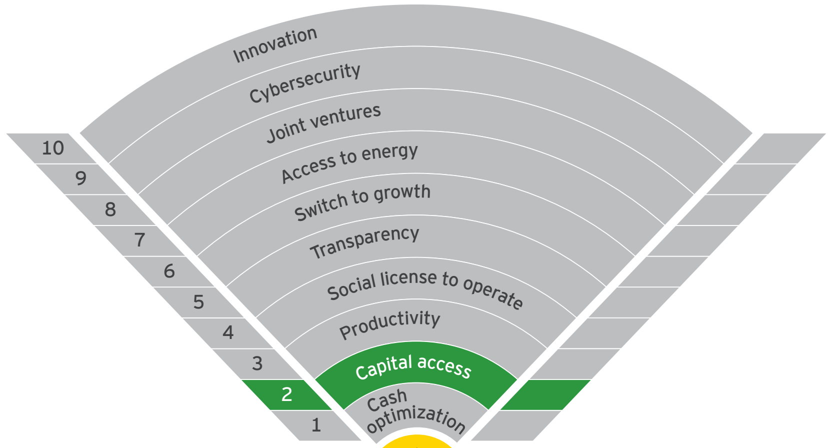
Video insight

EY's Lee Downham, Global Mining & Metals Transactions Leader, discusses capital optimization in mining and metals and the key issues to consider.

Limited pricing and demand visibility as a result of ongoing market volatility is challenging mining and metals companies as they plan for the future. Cash is king once again as companies seek to maintain balance sheet liquidity and implement plans to boost operational cash flow for long-term profitability.

In our view, there are three key focus areas by which mining and metals companies can effectively manage liquidity:

- **Make sustainable cost reductions that do not erode value:** During the mining boom, costs escalated substantially, in some cases by 200%. As soon as prices started declining, miners took measures to lower their costs and protect their margins by traditional means such as headcount reduction and mothballing projects. However, as prices look like they will be lower for longer, miners need to take a longer-term, more sustainable approach to managing their costs. Understanding what cost reductions need to be made, how quickly they can be implemented, what the payback period is and how long they can be sustained is key. Companies need to act now to protect margins and reduce exposure to current and future cost increases. We have already seen mining and metals companies being inventive in the areas of cost reduction, for example, by challenging all areas of expenses including the need for travel, considering the offshore sourcing of standard components and consolidating suppliers to facilitate a more effective negotiation on prices.
- **Increase focus on working capital:** In our recent report, *Making working capital work for you: unlocking cash in the mining sector*, we analyzed the working capital performance of 80 of the largest mining companies globally. This analysis showed that many miners had still not actively focused on working capital as a lever to improve cash flow, reduce costs and improve shareholder returns. Taking an enterprise-led approach, combined with a bottom-up change management program, has released cash flows totaling tens of billions of US dollars. Given that the aggregate levels of working capital in the sector amount to more than US$200b, there are still plenty of opportunities to further release cash.
- **Improve capital effectiveness:** Extracting more value from existing assets presents an opportunity to improve asset management capability. This can help to drive productivity and manage risk in a cost-constrained environment. Some key areas where we believe improvements can be identified include a shift from calendar- to condition-based maintenance with appropriate overall equipment efficiency (OEE) metrics, prioritizing sustaining capital and taking a top-down approach to facilitate appropriate capital allocation and effective control of risks.



02

Capital access

Key thought

With limited access to capital, companies are looking at alternative sources of finance and portfolio realignment options.

(From 3 in 2015)

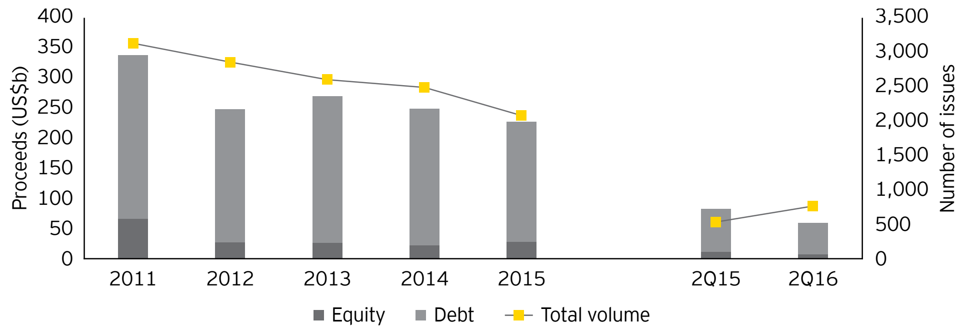
Video insight

EY's Lee Downham, Global Mining & Metals Transactions Leader, discusses capital access in mining and metals and the key issues to consider.

Capital raising continues to be an issue in the sector. In 2015, capital raised was down by about 10% YOY. There was a sharp decline in loan finance to the sector, and most loans were used for refinancing existing facilities rather than going into new projects.

Over the past 12 months, as the risk of default has increased, banks are only extending trade and long-term financing at an increased cost to those mining and metals companies with sufficient security to back the debt. In January 2016, both credit default swap (CDS) spreads and yields peaked, with credit access remaining constrained since.

Capital raised — value and volume (2011–2Q16)



Source: Thomson ONE, EY analysis

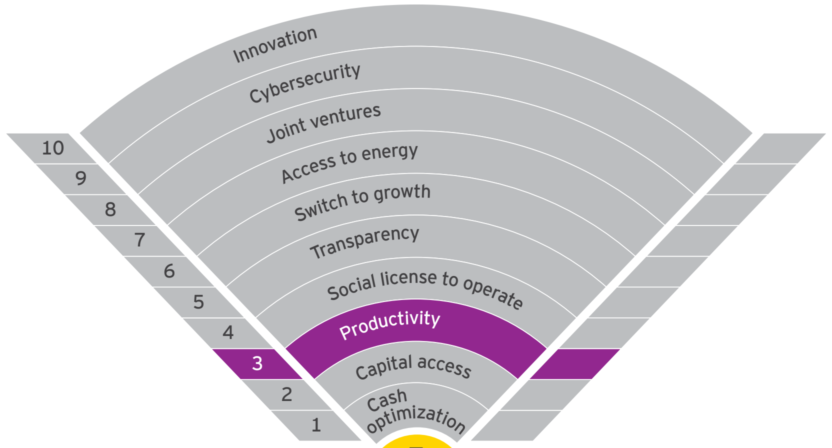
The backdrop of challenging market conditions has led to a number of alternative financing strategies being pursued. There were 11 major streaming deals in 2015 worth US$4.2b, up from US$2.2b two years earlier.[1] In 1H16, Silver Wheaton announced US$940m worth of precious metal streams while Franco-Nevada signed on for a US$500m silver and gold stream from Glencore's Antapaccay mine in Peru. There have also been a large number of royalty agreements, offtake and forward sales, as well as asset-backed financing on inventory and trade receivables.

Companies are also looking at their portfolios, which may lead to divestment of non-core assets or offering minority positions to joint venture partners to reduce capex requirements and maintain operational flexibility. This enables financial headroom to cope with volatility and convince lenders of future viability.

We expect the cost of capital to remain elevated in 2016 unless the commodity pricing environment improves. Corporate credit ratings continue to be placed on either negative watch or downgraded, while banks remain wary of extending credit to the sector. Equity markets in Australia, Canada and the UK are likely to remain subdued, with the potential risk of shareholder dilution from placements or rights issues, prompted by financial distress.

Private equity and well-capitalized producers continue to look for opportunities in the sector. These entities are likely to remain selective on deploying capital, targeting low-cost, de-risked operations with output readily marketable to end users. Their subsequent risk appetite will determine the minimum returns needed, with interest potentially skewed toward long-life assets in operation or scarce, strategically important industrial minerals.

1 "The dark side of metal streaming deals: strapped mining companies trade future value for cash," *Financial Post*, 21 December 2015.



03

Productivity

Key thought

Productivity remains the primary operational challenge in the mining sector, with many still struggling to make an impact.

(From 2 in 2015)

Video insight

EY's **Paul Mitchell**, Global Mining & Metals Advisory Leader, discusses the importance of productivity in mining and the key issues miners need to consider.

In EY's paper, *Productivity in mining: now comes the hard part*, we identified that the focus on "volume at any cost" during the boom generated a focus on growth and meant mines had to be larger. Scaling up these structures made them more complex to run and resulted in silos and diminished connectivity within operations. It created an integration gap within businesses, and dealing with it requires an end-to-end approach.

The key to achieving long-term sustainable productivity improvement

1 Focus on the assets, end-to-end view	2 Relentless pursuit of loss	3 Support your people

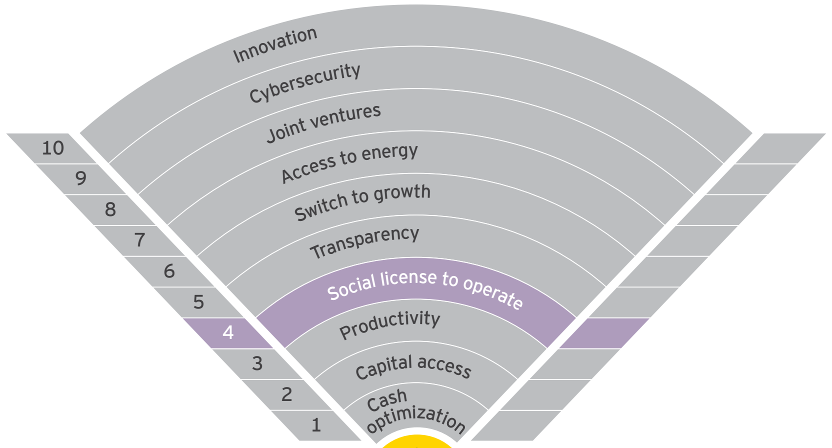
Each part of the business should be optimized not on its own but as part of a business system. We believe that the mining sector can learn a lot from other sectors on how to do this. There is evidence of significant productivity improvement and value creation through the adoption of a manufacturing mindset, whereby there is a relentless focus on the elimination of loss across the organization. Procter & Gamble, for example, is a leader in this space through its integrated work system, which has enabled the company to achieve YOY savings of US$1.2b over the past three years.[2] There is also a move toward digitalization of the value chain as more companies are implementing information systems to manage the full value stream using real-time production reporting systems while also adjusting their management operating systems to be more data-oriented.

Where companies have implemented actions to move toward operational reliability, significant benefits have been achieved.

Production uptime can quickly be increased by up to 5%, and revenue enhancement can typically be delivered in the range of 10%–20% without significant investment. Through stable and predictable operations, productivity, particularly around operations and maintenance activities, can also be increased. Operations spending less time dealing with emergencies can create opportunities to support continuous improvement efforts. As a result, this approach translates into improved safety, better forecasting and advanced integrated activity planning.

The critical role that people can play in the productivity transformation cannot be underestimated. Productivity improvement is the responsibility of everyone in the organization — relentless pursuit of loss, like zero harm, can transform the business. Visible leadership and significant investment in culture change and capability are critical to reach the next level of productivity.

2 "How Supply Chain Transformation Saved P&G US$1.2 Billion," *GT Nexus website*, accessed 17 May 2016.



04

Social license to operate

Key thought

Mining and metals companies need to embed sustainability into long-term planning and operate in tandem with local communities to retain social license to operate (SLTO).

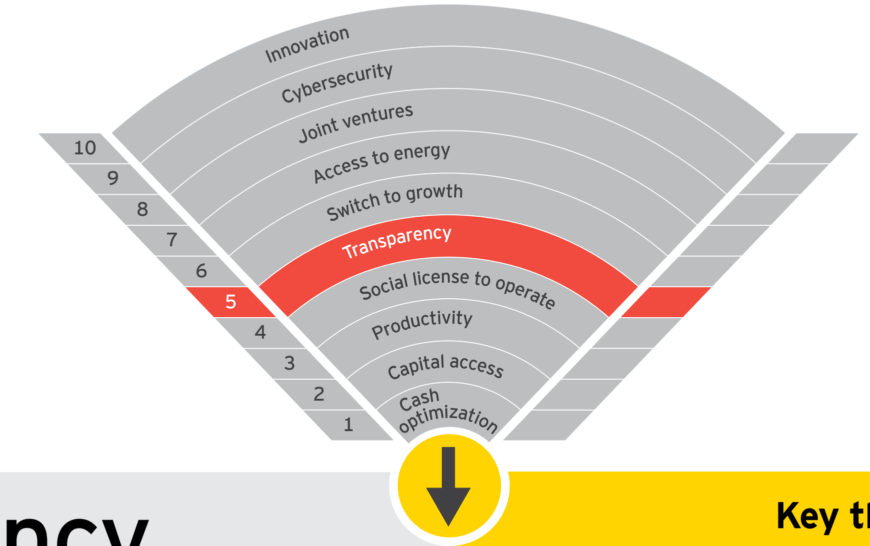
(From 5 in 2015)

Mine accidents, mining-related diseases, community protests and neglecting mine rehabilitation obligations are all having a significant impact on the sector's image and, in turn, on the ability of the companies to retain their SLTO. The following are a few of such recent impacts:

- We have observed a small rise in fatal accidents in 2015, raising the following questions: Is cost-cutting undermining the focus on zero harm?[3] Are technology, systems and safety being adequately resourced to be effective? Are companies at risk of undoing some of the successes in achieving better safety cultures?
- Mining-related diseases such as silicosis and pneumoconiosis (black lung disease) are back in focus. In 2015, the first confirmed case of black lung disease in 30 years was reported in Australia.[4] Resurgence of these diseases means that mining companies will face increased regulatory activity, new and tighter dust limits, operational changes and increased corporate liability. We have already observed large-scale, health-related civil claims. For example, in May 2016, a South African High Court ruled that people who contracted silicosis and TB as a result of unsafe conditions at mines could join together in a class action lawsuit against mining companies for compensation.[5]
- The crippling costs of mine rehabilitation are making it tough to seal deals on pits reaching the end of their mine life. Where transactions have been completed, new owners are often continuing to produce (even at a loss, in some cases) to avoid closure costs. In addition, as mining companies go into administration or bankruptcy, questions are being raised as to who will pick up the cost of mine closures and rehabilitating mine sites. If companies do not manage this issue, then governments will have to step in. For example, in Queensland, Australia, a chain-of-responsibility legislation was proposed in March 2016 to prevent taxpayers from having to pay for environmental cleanups.[6]

To maintain a strong SLTO, it is important to integrate sustainability into long-term planning and link key performance indicators with productivity outcomes as well as remuneration structures. Successful companies have highlighted the value of operating in tandem with communities and have shown that it is possible to engage through mutual value creation — for example, offering some local ownership and sourcing labor and procurement domestically will provide a greater level of community engagement.

3 "No safety, no pain," *Australasian Mine Safety Journal*, 30 October 2015, accessed 16 June 2016.
4 "Black Lung disease – Is the sleeping giant waking up?" *Clayton Utz insights*, 26 May 2016, accessed 16 June 2016.
5 "Ill mineworkers in South Africa win historic silicosis battle," *The Economist*, 23 May 2016.
6 "Confidence in the mining industry suffers following legislation in Queensland," *Mining Global*, 16 May 2016, accessed 16 June 2016.



05

Transparency

Key thought

While resource nationalism has slowed, transparency initiatives are accelerating.

(From 4 in 2015)

While resource nationalism has retreated in many regions over the past 12 months, transparency initiatives continue to gain momentum as governments seek to improve governance in their countries.

A focus on transparency, rather than on resource nationalism, in turn, improves the investment climate of a country by providing a clear signal to investors and international financial institutions that the government is committed to good governance and rule of law. Improving transparency can help mining and metals companies show their social contribution – providing local communities with greater access to information and, in turn, helping to refute claims of not paying their fair share.

Initiatives to promote transparency started with the Extractive Industries Transparency Initiative (EITI) in 2003. This was followed by many other country- and region-specific disclosure initiatives in the US, the EU and Canada. More details about these rulings can be found in EY's paper *Disclosing payments to governments in an era of transparency*.

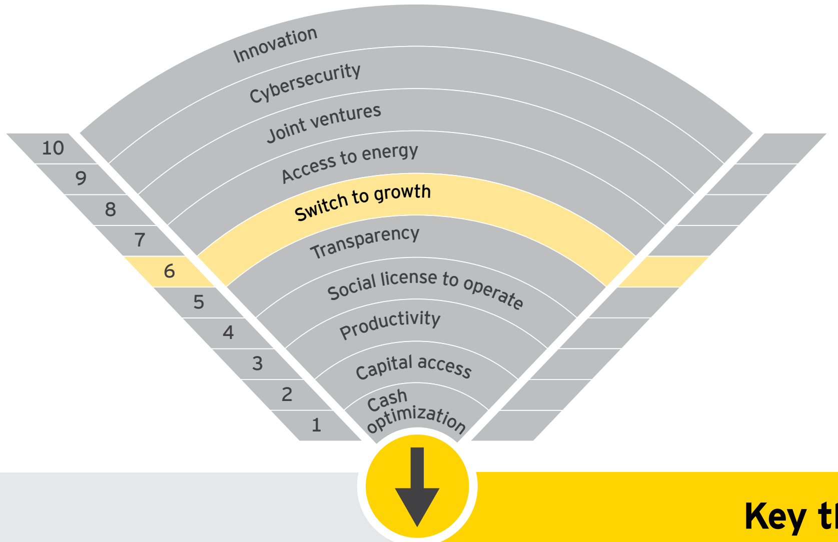
These initiatives affect all mining and metals companies, regardless of where they operate, with some having to comply with multiple standards. Failure to do so will attract penalties of noncompliance and, in some cases, may have criminal consequences. As a result, companies need to:

- Identify the level and granularity of disclosure and reporting necessary and then establish processes to gather and assemble the data regarding government payments for proper reporting
- Review their systems to confirm that they have captured the detail and data as required
- Confirm that the data is reliable and tells the story that they are happy to share publicly

The reporting of government payments is and will remain a significant challenge for many, but can only help to enhance investor confidence and generate trust with stakeholders. With Rio Tinto reporting on its taxes since 2010 in an annual *Taxes Paid* publication, other large global mining companies have also started to voluntarily disclose their government payments.

Resource nationalism updates

You can access the latest resource nationalism quarterly updates in EY's *Mining & Metals Quarterly Briefing*.



06

Switch to growth

Key thought

Switching to growth at the right time to take advantage of a buyer's market will boost long-term shareholder value.

(From 1 in 2015)

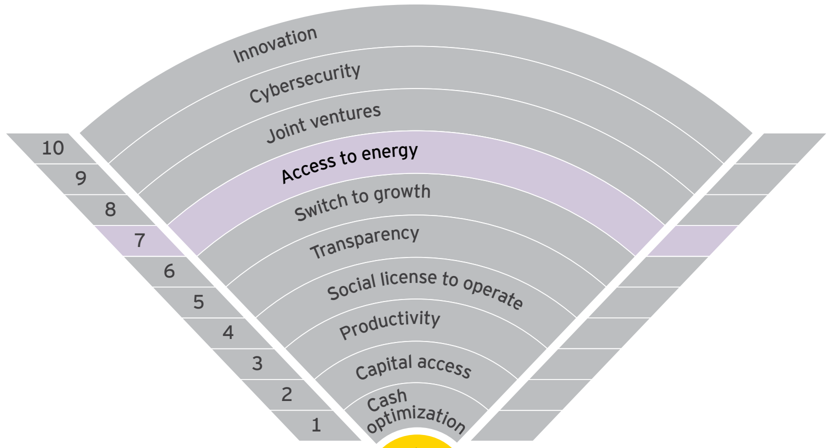
Mining and metals companies need to break free of the pro-cyclical, short-term behavior that currently prevails. Even though it now appears that commodity prices will be lower for longer, preparing for future growth remains essential if companies are to stay ahead of the competition. A clear understanding of growth options available – whether to build or buy – is essential. This requires an ongoing awareness of the market (capital markets, global supply and demand, geopolitical developments and customer behavior) and the competition. It may also involve a process of downsizing existing portfolios to realize capital and free up scarce resources to support future growth opportunities.

The first half of 2016 witnessed several opportunistic acquisitions aimed at gaining exposure to specific metals, improving marketing premiums, realizing operating synergies or adding scale to existing operations. One such example is Barrick Gold's US$610m divestment of Bald Mountain and Round Mountain to Kinross Gold Corp. to strengthen its portfolio and help lower the company's cost profile.[7] Beyond improving reserve lives and fulfilling strategic objectives, these transactions further supplement existing cost-cutting initiatives by being value-accretive to stakeholders in the short term. This is probably the best time for mid-tiers with good financial backing to acquire high-quality assets as the majors refocus their portfolios and sell the assets that do not fit their core business. China Molybdenum, for instance, has taken advantage of the current market environment, spending US$4.15b on tier 1 acquisitions in 1H16 from Anglo American and Freeport McMoRan, driving speculation that it may become a global mining major through acquisition.[8]

Managing liquidity must be balanced with asset portfolios that represent attractive shareholder value through the whole cycle. Although companies have focused on reducing cash outlays and increasing financial flexibility, EY believes that continued volatility represents an opportunity to reposition portfolios for a cyclical recovery.

Identifying areas for growth in conjunction with near-term liquidity should remain an important consideration for management, especially when planning to create shareholder value. This also includes digital strategy and cultivating the right skills and people. This is an optimum time to think about the diversity and skills needed for the future. Doing so may facilitate the timely acquisition of assets that could otherwise be difficult to secure after a full cyclical recovery. It also helps in avoiding future value destruction from paying excessive acquisition premiums and in beating competitors by opportunistically securing the strongest assets ahead of the market.

7 "Kinross acquires strategic Nevada assets," *Kinross Gold Corporation press release*, 12 November 2015.
8 "China Molybdenum still in market for 'tier 1' assets," *SNL*, 24 June 2016.



07

Access to energy

Key thought

It is no longer a matter of scarcity, but rather the ability to identify, prioritize and implement the best source of energy for long-term tangible and intangible benefits.

(From 8 in 2015)

As energy consumption can be anywhere from 15% to 40% of the operating budget of a mine, cost is naturally an important consideration when choosing an appropriate source of energy. However, this is only one aspect of a far larger strategic decision. Other considerations are:

- Uncertainty of availability and cost of energy over the entire mine life
- Counterparty risks
- Operational alternatives
- Social, financial and reputational implications of every choice

Mining and metals companies today often use a mix of energy sources – typically a combination of fossil fuels, hydroelectricity and renewable energy, varying by location, energy supplier and capital availability. Given the rapidly increasing competitiveness of renewable energy, wind energy and solar energy in particular, large energy consumers are undertaking a significant change in how they procure and generate the energy they need. Renewable energy can provide them with long-term, fixed-price electricity, thus mitigating any exposure to fuel price volatility in the future, be it oil and gas prices or the cost of importing electricity from neighboring countries. Renewable energy will also reduce exposure to any direct or indirect pollutant costs, such as greenhouse gases or carbon taxes. Renewable energy can also result in direct financial benefits by the availing of local incentives, capital allowances or reduced transmission costs. In markets such as South Africa and Chile, renewable energy plants are currently generating electricity at a cheaper price than anything provided by local utilities and at a price significantly cheaper than any on-site diesel generation.

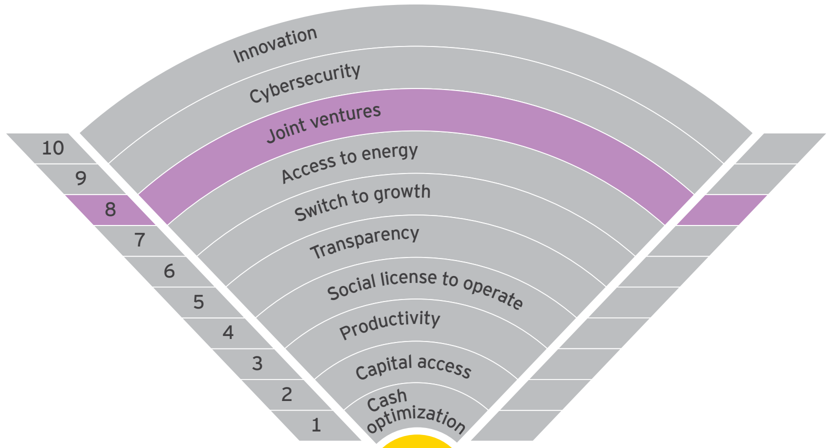
On-site renewable energy generation, efficiency technologies and micro-grids are helping mining and metals companies to create significant operational cost savings. The use of combined storage and PV hybrid systems[9] can halve the fuel costs of off-grid producers that are currently reliant on liquid fossil fuels being transported and consumed on-site. This is in addition to financial, social and reputational benefits that may accrue due to reducing diesel-related greenhouse gas emissions and pollutants.

In addition to the cost savings, the decision to adopt renewable sources of energy and reduce energy consumption is also being influenced by national and regional policies and legislation to reduce carbon emissions. Several miners, including Rio Tinto and Anglo American, have signed the Paris Pledge for Action at COP21 in support of the agreement to limit the global warming temperature rise to less than 2 degrees Celsius. Rio Tinto focuses on technological development to improve energy solutions. For example, it has modernized its Kitimat aluminum smelter through the use of energy-efficient AP technology, which has improved the energy intensity of the smelter by 30%.[10]

If the energy consumer is willing to enter into an appropriate long-term power purchase agreement for the electricity it consumes, renewable energy plants can be independently developed, built, financed and operated, so that these benefits are locked-in for the consumer. With operating margins being so dependent on both commodity prices and energy prices, increased focus on renewable energy and smarter energy solutions by the mining and metals community is likely to continue.

9 "Energy storage, PV-hybrid systems offer huge potential for off-grid mining sector," *pv-magazine*, 18 March 2015, accessed 16 June 2016.

10 "Balancing energy needs and environmental impacts," *Rio Tinto website*, accessed 15 July 2016.



08

Joint ventures

Key thought

While there is a great upside to joint ventures (JVs), the risks to non-operators is significant given their lack of inclusion in operational decisions which can have large knock-on effects.

(New)

Companies enter into JV arrangements for a variety of reasons, including capital intensity, risk mitigation, access to resources and technology, supply chain optimization, market positioning, regulatory requirements or political sensitivities.

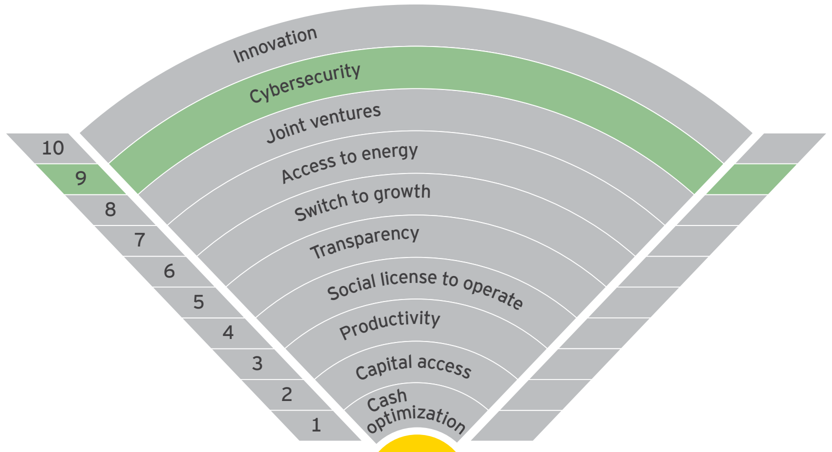
When JVs are managed well, they have the potential to deliver substantial value to stakeholders, significantly enhancing the value of company portfolios and access to reserves and capabilities. However, when these relationships go wrong, they can be extremely disruptive, particularly to project schedules and key decision points. Aside from the disruption to the core business, arbitration and legal proceedings relating to any failure can be costly and time-consuming distractions for the management of both the JV and the parent organizations.

Non-operators may be particularly vulnerable to operating risks as they have very limited say in the day-to-day operations at mine sites. Any decisions by the operator could diminish value creation for the non-operator or even result in large penalties or liabilities in the event of accidents or other operational issues. In the last few years, operational risks have become so complex and dynamic that it is almost impossible for an operator or a non-operator to reasonably factor in risk at the start of a project.

Andrew Mackenzie, CEO of BHP Billiton, brought JVs into stark focus when he said that the group was looking into whether governance should change at non-operated JVs. He said that BHP Billiton would see "whether a more petroleum-type model might be more appropriate in the future" for its non-operated mining ventures.[11]

Non-operating JV partners need to consider what mitigation strategies should be put in place to protect their investments, such as conducting non-operator audits or embedding non-operator management to provide increased visibility. Regular challenges by active investors will remove complacency and demand a greater consideration of all stakeholder interests when making operational decisions.

11 "BHP Billiton puts joint ventures under review after dam breach," *Financial Times*, 16 November 2015.



09

Cybersecurity

Key thought

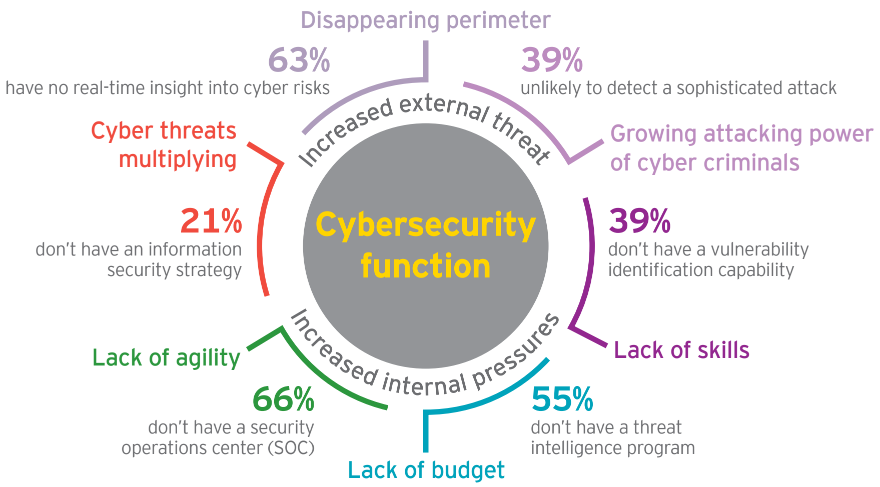
Understanding cyber risk exposure across IT and operational technology (OT) platforms is a major challenge facing mining and metals companies.

(9 in 2015)

Video insight

Paul O'Rourke,
EY's Managing Partner for Cybersecurity, Asia Pacific, explains why mining and metals companies need to understand that cybersecurity is a key risk to the ongoing success of their business.

Mining and metals companies have begun to tighten their IT security, but many admit that there are still known vulnerabilities in their cyber defenses and that they are not moving fast enough to mitigate these. About 21% of mining and metals companies surveyed in EY's annual *Global Information Security Survey* still do not have an IT security strategy.[12] This means that many in the sector are lagging in establishing foundational cybersecurity.

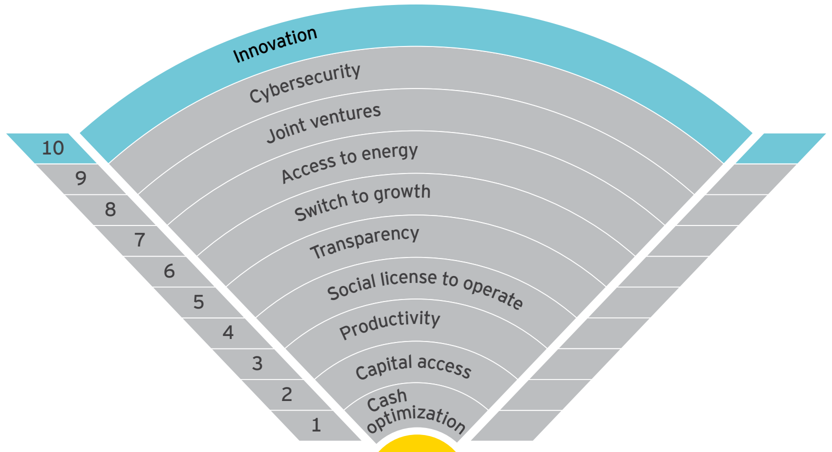


Source: Survey of mining and metal companies in the EY *Global Information Security Survey*, 2015

We believe that the convergence of IT and OT platforms, protocols and techniques, which traditionally have been separated, will create the biggest threat to mining and metals companies. With the IP-enabling of OT infrastructure, companies need to have the same level of cyber controls, methods, frameworks and governance over their OT environments as they do for their IT environments. However, OT security is only just emerging on CEO agendas, and yet sensitive data and operational integrity, which can impact production, safety and reputation, are key vulnerabilities. It is vital that mining and metals companies have a baseline understanding of their cyber risk exposure across both of these environments, as well as on their wider ecosystem of third-party suppliers or extended value chain.

Focusing on cyber risk rather than purely cybersecurity is critical – cyber risk is not just a financial risk but fundamentally a reputational and an intellectual property risk. Companies must focus their efforts to complicate attacks, detect malicious activities, respond to threats and educate the workforce to be security-conscious. Many companies have identified cyber as a material risk to their business, and this is reflected accordingly in their risk register. Those that are ahead of the curve are realizing that OT security requires significant investment in both the build of OT technology capability and scarce and in-demand specialists. Unfortunately, given the low commodity prices, for others we are seeing a squeeze on budget for cyber-related initiatives. Without this budget, there will not be adequate allocation of resources – capital and people – to appropriately manage the cyber risk exposure.

12 *Global Information Security Survey*, EY, 2015.



10

Innovation

Key thought

Innovation is a key enabler of productivity, but in the current market companies are not investing in it.

(10 in 2015)

Video insight

Paul Mitchell,
EY's Global Mining & Metals Advisory Leader, discusses why innovation is a key business risk for 2016 and what it means for mining and metals companies.

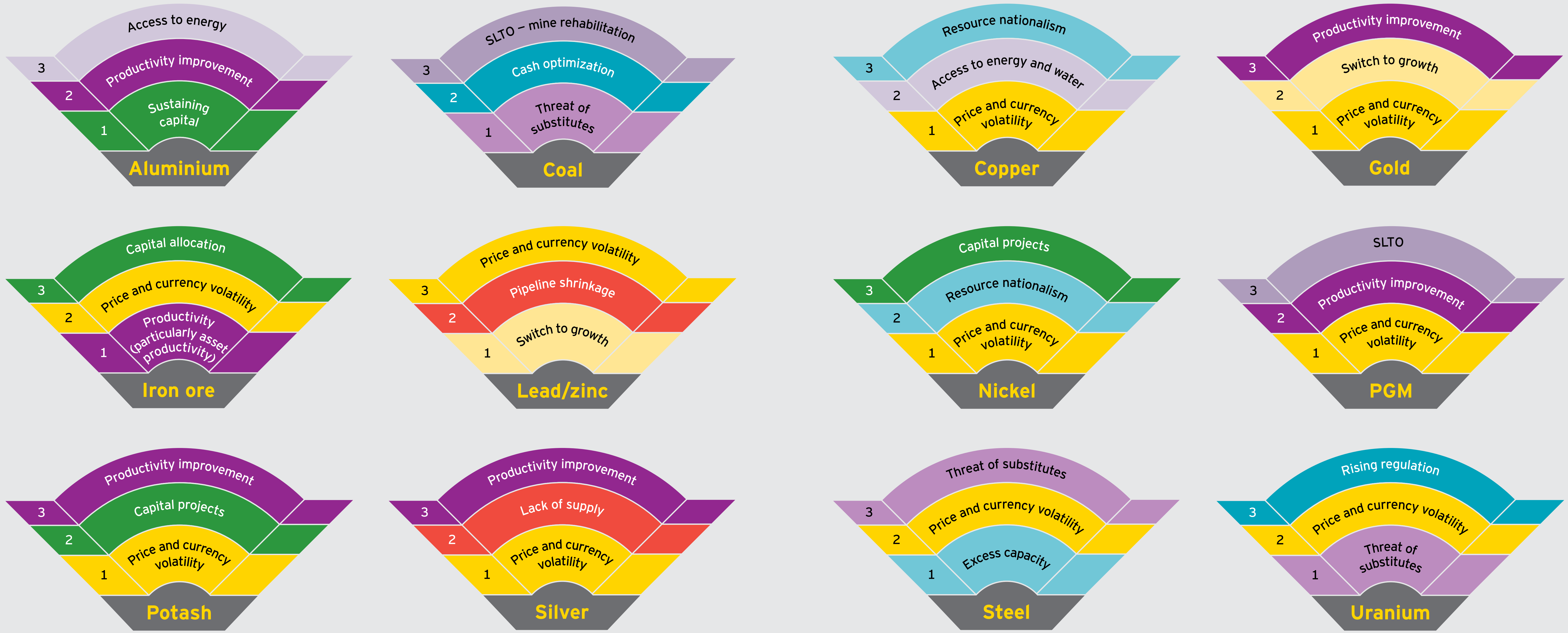
Despite the commodity downturn and the resulting decrease in investment, innovation is still a key risk. This is because innovation is a key enabler of productivity improvement that will provide long-term competitive advantage when the market improves.

Over the past 6–12 months, EY has held a number of innovation workshops and conducted sector surveys on innovation in Australia, Canada and South Africa. We have seen a number of common themes emerge, including the following:

- **Lack of budget:** The mining sector has traditionally spent significantly less than other sectors on innovation. With the downturn in commodity prices, while many have an innovation strategy, few have a discreet innovation budget, and many innovation programs have been put on hold.
- **Many barriers:** Our survey participants cited technological uncertainty, followed by skills deficit and lack of innovation culture, as the top three barriers to investing in innovation. Lack of budget was the fourth.
- **Innovation initiatives are not transformational:** Current innovation initiatives in the sector are focused on operating a bit faster or more efficiently rather than being disruptive – this will provide short-term benefits but will not enable companies to make the step-change needed for future sector growth.
- **Collaboration is key:** To prepare for future growth, we believe that now is the time for collaboration on innovation with other sector participants, other sectors, service companies and academic institutions. Many companies we interviewed were open to collaboration and currently rely on service providers and their own employees for innovation, regardless of whether they have the right culture, diversity or structure for this.
- **Unrealistic return on investment expectations:** Many see the innovation investment payback as for a short term, especially with the pressure on shareholder value – 70% thought that the horizon should be less than two years. EY's view is that innovation needs to be a mix of short and long term – it shouldn't be a driver for short-term bottom-line improvements but to improve long-term returns.

To be successful, companies need to align their innovation program to their strategy; have a clear change management program; have the right structure, processes and systems in place; and most importantly, not just focus on technology. Finally, mining and metals companies need to allow their teams to fail fast and fail often, as sector transformation will only come from innovation.

Top risks for commodities



Note: Price and currency volatility encompasses the top two business risks of cash optimization and capital access.

How EY's Global Mining & Metals Network can help your business

With a volatile outlook for the sector, the global mining and metals industry is focused on how to maintain a strong and flexible balance sheet while preparing for future growth. The sector is also faced with the increased challenges of improving productivity, access to capital, dealing with increased transparency, maintaining license to operate and cybersecurity.

EY's Global Mining & Metals Network is where people and ideas come together to help mining and metals companies meet the issues of today and anticipate those of tomorrow by developing solutions to meet these challenges. It brings together a worldwide team of professionals to help you succeed — a team with deep technical experience in providing assurance, tax, transactions and advisory services to the mining and metals sector. Ultimately it enables us to help you meet your goals and compete more effectively.

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