# Worldwide Mining Exploration Trends

A Special Report from S&P Global Market Intelligence
for the PDAC International Convention

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S&P Global
Market Intelligence

# A Message from PDAC

The PDAC is pleased to partner again with S&P Global Market Intelligence (formerly SNL Metals & Mining) in making available to association members and Convention 2017 delegates this special report on global exploration trends.

As the exploration and mining sector recovers from the bear market, it is important to be aware of the trends in global exploration. This information helps the PDAC support our members through the development of programs, policy recommendations and advocacy.

Having amalgamated the databases of Perth-based Intierra, Stockholm-based Raw Materials Group and Halifax-based Metals Economics Group, S&P Global Market Intelligence is acknowledged as the leader in providing comprehensive exploration, production and financial information to the mining industry worldwide.

- Andrew Cheatle, Executive Director, PDAC

# World Exploration Trends

Last year marked the fourth consecutive year of declining exploration expenditure, and the industry has slashed its budget on the search for metals to barely one-third of the record high of US$21.5 billion allocated in 2012.

S&P Global Market Intelligence's latest Corporate Exploration Strategies (CES) report calculates that the budget for nonferrous exploration in 2016 totaled US$6.89 billion, down 21% from the total in 2015. Including estimates of budgets that could not be obtained, exploration by companies spending less than US$100,000 and private companies that do not report their data, CES estimated the total for nonferrous metals exploration at US$7.2 billion.

Nevertheless, the past three quarters have brought signs of optimism for a long-struggling mining industry. Since last March, exploration companies have increasingly been able to raise funds, which represents a marked improvement over recent years. Despite recent concern over the availability of finance as we enter 2017, S&P Global Market Intelligence is cautiously optimistic for the near term, and expects corporate exploration budgets this year to be flat.

## CES Report

S&P Global Market Intelligence's 27th edition of the Corporate Exploration Strategies (CES) 2016 report evaluates the industry's exploration spending trends and analysis. The annual publication examines exploration data on thousands of mining companies around the world, including details on the scope and direction of exploration programs, current activities and strategic orientation. The study provides insight into how mining companies allocated their exploration spending by commodity, location, and stage of development.

The Worldwide Exploration Trends report is an extract of the CES report. We hope you will enjoy the report and obtain valuable insights to help you make informed decisions critical to your business planning.

Notes: S&P Global Market Intelligence obtains the data used in its Corporate Exploration Strategies (CES) studies through the generous cooperation of the surveyed companies. The individual nonferrous exploration budgets covered by the study include spending for gold and silver, base metals, platinum group metals, diamonds, uranium, rare earths and potash. They specifically exclude exploration budgets for iron ore, coal, aluminum, oil and gas, and many industrial minerals.

All figures are reported in U.S. dollars, and all historical exploration figures throughout this report represent dollars of the day; i.e., they have not been adjusted for inflation.

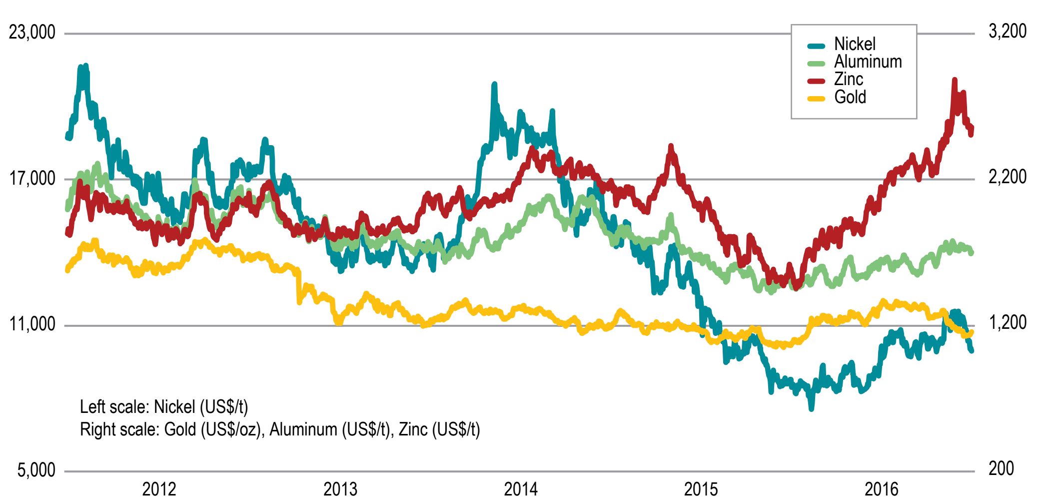
# Improving Scenario

The past year was a good one for mining, at last, but 2016 was a year of two halves for the global economy. Concern about deflation and recession peaked on June 23 with the U.K.'s vote to leave the European Union (Brexit). The resultant emphasis on reflation through fiscal policy, and the subsequent growth-friendly election of Donald Trump, meant the second half of the year saw investment in favor of assets that benefited from growth and inflation.

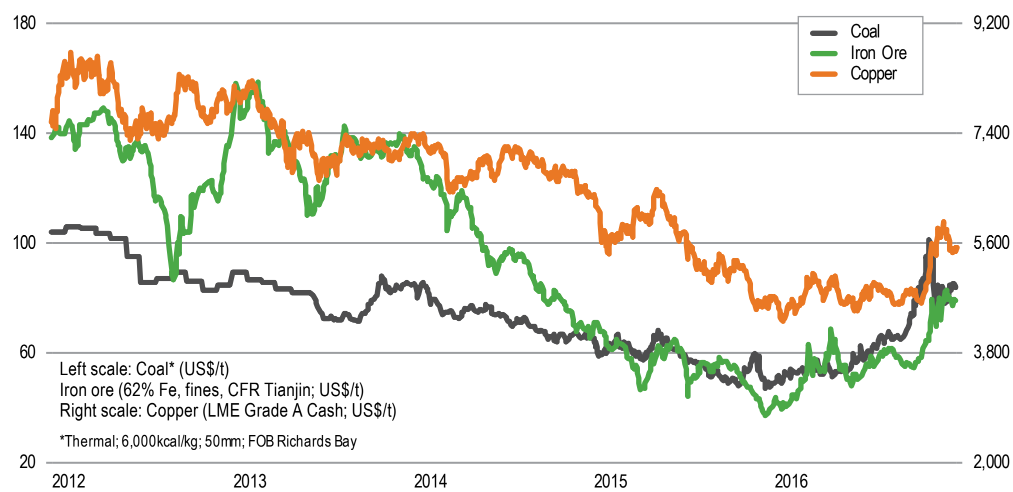
Equities suffered in the first half of the year but recovered strongly over the second six-month period at the expense of bonds. As a result, defensive stocks did better in the first six months of 2016, but it was then the turn of cyclical stocks, which benefited as the investment mood changed. The improved sentiment was such that the year ended with the Vix index (which tracks the value of options that hedge against volatility) at a 30-month low.

The mining sector, in particular, saw a significant mid-year shift in sentiment, with attention turning from precious metals to industrial metals and minerals. In the six months to the end of June, gold had risen almost 25% to US$1,321/oz, but the precious metal subsequently retreated to around US$1,135/oz, an increase over the whole year of just 7%.

## Chart 1: 5-Year Metal Price Graphs



## Chart 1: 5-Year Metal Price Graphs (continued)




This scenario was reversed for three of the most important industrial commodities. Iron ore (62% Fe) was up an impressive 26% at the mid-year point, but did even better during the second half, to end 2016 up 79%. Thermal coal had risen 17% by end-June and 69% at year-end. Similarly, copper was up 3% at the mid-year point but gained ground during the second six months to end the year up 17%.

After a dire 2015, the other major metals improved steadily throughout 2016. Aluminum, for example, was up 10% and 14% at the six and twelve month stages respectively, with nickel improving 7% and 13%, and zinc rising 32% and a highly impressive 61% at the mid- and end-year points.

## Markets Trumped

If last year was good for mining, 2017 promises to be even better. Analysts are increasingly bullish about the sector, and Goldman Sachs, for example, recently advised clients to buy commodities. In his annual Commodities Outlook report, the head of commodities research at Citigroup, Ed Morse, said "there is absolutely no doubt that markets are at a turning point."

The new U.S. president started his four-year term on January 20 with the country's equity markets at near record highs. Trump's victory in November had sparked a strong rally in U.S. share prices, following campaign promises of fiscal stimulus, infrastructure spending and relaxed corporate regulation.

Some of the initial investor optimism faded amidst a perceived lack of clarity on important growth policies, but in mid-January expectations of global economic growth had reached their highest level in two years. According to a survey of fund managers by Bank of America Merrill Lynch, 62% of the investors polled expected a stronger global economy this year, up from 57% in December.

A net 83% of the fund managers in the BoAML survey expected higher inflation. This expectation has been difficult for bonds, which suffered a sharp sell-off globally in December and January.

The dollar rose steeply in the second half of 2016 on expectations of higher U.S. interest rates, and reached a trade-weighted 14-year high in early January. However, trading in the American currency has been volatile in the New Year following concern expressed by Trump over the strength of the dollar. Currency markets were calmed in mid-January when his nominee for Treasury Secretary, Steven Mnuchin, indicated that the new administration would not adopt a weak-dollar policy.

The U.S. currency has also found comfort in hawkish comments by Federal Reserve chair Janet Yellen about interest rates. In mid-December, the Federal Open Market Committee (FOMC) increased official borrowing costs from 0.25% to 0.50% (with a target range of 0.50-75%), as expected, but surprised markets by signaling three interest-rate rises in 2017, rather than the two increases suggested at the FOMC's meeting in September.

Yellen said the December rate rise was a "reflection of the confidence we have in the progress the economy has made, and our judgment that that progress will continue." Markets immediately factored in a 45% chance of the Fed raising interest rates at least three times in 2017, and an almost 77% likelihood of at least two increases. Ahead of the presidential election, the chance of three interest rate rises this year had been assessed at only 5%.

Higher American interest rates have been made even more likely by Chinese sales of U.S. government debt. In November, Beijing's holdings fell by their biggest monthly amount in almost five years, with the net sales of US$66 billion extending the disposals to a sixth consecutive month. This has seen China cede its position as the largest foreign owner of U.S. Treasuries to Japan.

China has been selling dollars to support the renminbi, which has been falling against the U.S. currency amid concerns over the health of the Chinese economy. However, the country's gross domestic product grew 6.7% in 2016, and achieved a creditable 6.8% at an annualized rate for the fourth quarter, in real terms, compared with 6.9% in 2015. Although last year saw the slowest full-year growth rate since 1990, it was within the government's target of 6.5-7.0% and was above the expectations of most analysts.

## Concern Remains

Equity markets are testing all-time highs despite warnings of a trade war between the world's two largest economies. Beijing is reported to be ready to retaliate if the incoming U.S. administration imposes new tariffs on Chinese imports.

In his election campaign, President Trump pledged to label China as a currency manipulator and threatened tariffs of up to 45%. Recent studies estimated that U.S. job losses associated with Chinese competition could exceed two million, many being in regions that voted heavily for the Republican candidate in November's election.

Despite the concern over cheap imports, U.S. wages are growing at their fastest annualized rate since 2009. Average hourly earnings in the U.S. climbed 0.4% in December compared with the previous month, and were 2.9% above year-earlier earnings. American companies have added 15 million jobs since the 2010 low, but the labor force participation rate (a gauge of the proportion of the working-age population with a job or actively looking for one) remains a modest 63%.

Commodity markets are delicately poised. On the one hand there is optimism based on an infrastructure-fueled metals boom in the U.S., facilitated by fiscal expansion and easier corporate regulations. On the other, the Chinese economy is still giving cause for concern, and the Trump administration is threatening increased tariffs and an isolationist agenda.

# The Search for Metals

The exploration sector remained depressed again in 2016 and, after a record high of more than US$20.5 billion in 2012, exploration budgets have now fallen for four consecutive years. The 2016 exploration budgets by 1,580 companies totaled only US$6.89 billion, a year-on-year drop of 21% and barely one-third of the level budgeted in 2012. Indeed, the average 2016 exploration budget among the surveyed companies was US$4.4 million, the lowest since 2009, and the median budget was US$800,000, which is the smallest in more than a decade.

The Corporate Exploration Strategies (CES) report for 2016 covers an estimated 95% of worldwide commercially oriented nonferrous exploration budgets. The estimated total for nonferrous metals exploration is increased to US$7.2 billion (still US$2 billion less than the total budgeted in 2015) if estimates are included for budgets that could not be obtained, exploration by companies budgeting less than US$100,000 and by private companies that do not report their data.

As detailed in S&P Global Market Intelligence's Monthly Industry Monitor report*, some positive signs have recently emerged, with financings having gained traction since March 2016. Nevertheless, caution persists as the amounts being raised remain far below those of a few years ago, and financings for the fourth quarter of 2016 seem likely to have been lower than required to suggest a significant improvement in exploration budgets this year.

In 2016, companies lowered their spending in an attempt to reassure investors, with the major companies shrinking exploration departments and the junior companies slashing spending. Across the board, projects were put on hold and agreements renegotiated, with a marked shift away from grassroots exploration in favor of later-stage, less-risky assets.

As the industry struggles, organic growth will continue to slow and project pipelines will be affected. Exploration spending by the major companies, which are likely to remain focused on brownfields targets until more positive economic conditions prevail, characteristically outperform, or at least track, the industry trend.

Therefore, given some positive signs, S&P Global Market Intelligence expects a small uptick in the majors' budgets in 2017. Unfortunately, it seems likely that the aggregate exploration budget for junior explorers will be slightly lower in 2017. Given the still mixed indicators, the CES team is cautiously optimistic overall, and projects total corporate exploration budgets for 2017 to be flat.

* The Monthly Industry Monitor report combines drill results, junior and intermediate financings, initial resource announcements and project milestones into the Pipeline Activity Index (PAI), as a measure of the relative health of the industry.

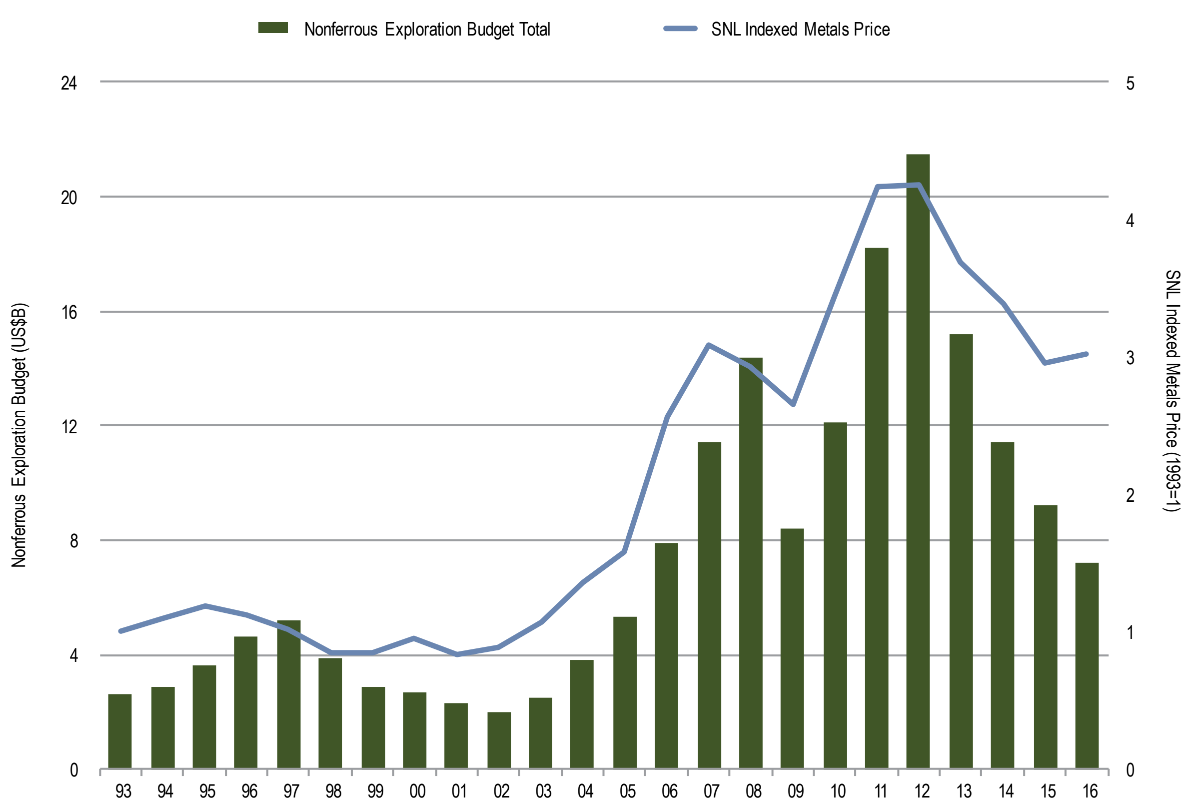
## 20-Year Trend

Figure 1 below shows the estimate of annual nonferrous exploration allocation since the early 1990s, relative to a weighted metals-price index. This figure shows the cyclical nature of exploration investment, and the correlation between metals-price trends and exploration spending, sometimes with a one-year lag.

Through the early 1990s, the aggregate nonferrous exploration budgets reported by CES steadily increased to peak at US$4.67 billion in 1997. As metals prices slumped in the following years, a combination of substantial cutbacks and mergers by the majors, and a loss of funding for a great number of junior companies caused exploration budgets to decline for five consecutive years. By 2002 the total was at a 12-year low of US$1.77 billion, representing an overall decline of more than 62%.

The initial increase in worldwide exploration budgets from 2002's low was due to a combination of factors. These included higher gold prices and rising investor interest that revived the junior sector, increased spending by the majors as they recognized the dearth of new projects moving up the pipeline, and significantly reduced consolidation at the top of the industry from the high levels of 2000 and 2001. Spurred by the economic boom in China, many metals prices continued to rise, reaching peaks in 2007 and early 2008. Budget increases by the majors and meteoric budget increases by the juniors pushed the worldwide exploration budget total to a new

### Figure 1: Estimated Global Nonferrous Exploration Budgets



high of US$13.75 billion in 2008 — an almost eightfold increase from the bottom of the cycle six years earlier.

These boom years came to an abrupt halt in September 2008, with companies being forced to slash their exploration plans as the world fell into economic chaos. The resulting 42% (US$5.77 billion) drop in worldwide nonferrous exploration from 2008's high was the largest year-on-year decline (in both dollar and percentage terms) since the CES studies were first published in 1989. Most metals prices bottomed in early 2009, and the industry recovered much more quickly than predicted. The global economy improved markedly through 2009 and 2010, and with it metals prices, most of which traded well above their long-term averages through 2011. In response, most companies aggressively increased their exploration budgets, lifting the industry total by 44% in 2010 to US$11.51 billion, and a further 50% in 2011 to US$17.25 billion.

Marking a transformational year, 2012 began with most metals prices at or near recent highs, relatively strong investor interest in the mining sector and signs that the industry was enjoying a return to the boom times of 2007-08. Exploration budgets increased 19% in 2012, setting a new all-time high of US$20.53 billion. However, warning signs appeared as the year progressed. Investors began turning away from junior explorers, and took aim at the CEOs of a number of major producers that had failed to deliver expected returns. In response to investor activism and uncertain demand for their products, the major producers launched new spending-reduction strategies that focused on profit margins over growth.

In addition, the investment climate for the mining sector turned distinctly chilly, as international political, economic and market uncertainty remained stubbornly intractable. By mid-2012, the combined pressures of these factors had precipitated a pullback in exploration activity, resulting in companies with comparable data spending 5.9% less than originally budgeted for the year.

As the effects of investor caution and discontent took hold, companies continued to sharply curtail their exploration budgets from 2013 to 2015, resulting in a 39% decline to a total of US$8.77 billion and marking the first time aggregate budgets had fallen below US$10 billion since the 2008-09 crash. Despite some positive signs in 2016, the increased junior financings and stronger metals prices were not enough for explorers to raise their budgets. The global exploration budget fell 21% last year to US$6.89 billion, well beyond the 10-15% forecast in 2015.

## Patterns in Corporate Expenditure

The sharp drop in exploration budgets in 2009 marked the first time in seven years that companies with comparable budgets failed to increase their planned spending over the previous year's actual spending. Budgets increased 36% in 2010 and a further 44% in 2011, compared with the previous year's actual spending, before the pace cooled in 2012, when the net increase was a relatively modest 13%.

Since 2012, and marking four consecutive years of declining investment, comparable annual budgets fell 24%, 20% and 11% twice. Of the 1,748 comparable companies in 2016, 26% increased their budgets by more than US$100,000 over their 2015 actual spending, 39% decreased their budgets by more than US$100,000 and 35% changed by US$100,000 or less. Including the companies with changes of US$100,000 or less, 601 companies increased their budgets by a combined US$769 million and 873 companies decreased their budgets by a total of US$1.66 billion.

Due to their reliance on equity market conditions, junior companies traditionally lead increases and decreases in exploration spending.

The comparable budget total for 1,425 juniors in 2016 accounted for 39% of the total decrease (1,649 juniors accounted for about 47% of the total decrease in 2014), 96 majors accounted for 36% of the decrease, 156 intermediate companies accounted for 15%, and the 71 government/other companies accounted for about 9%.

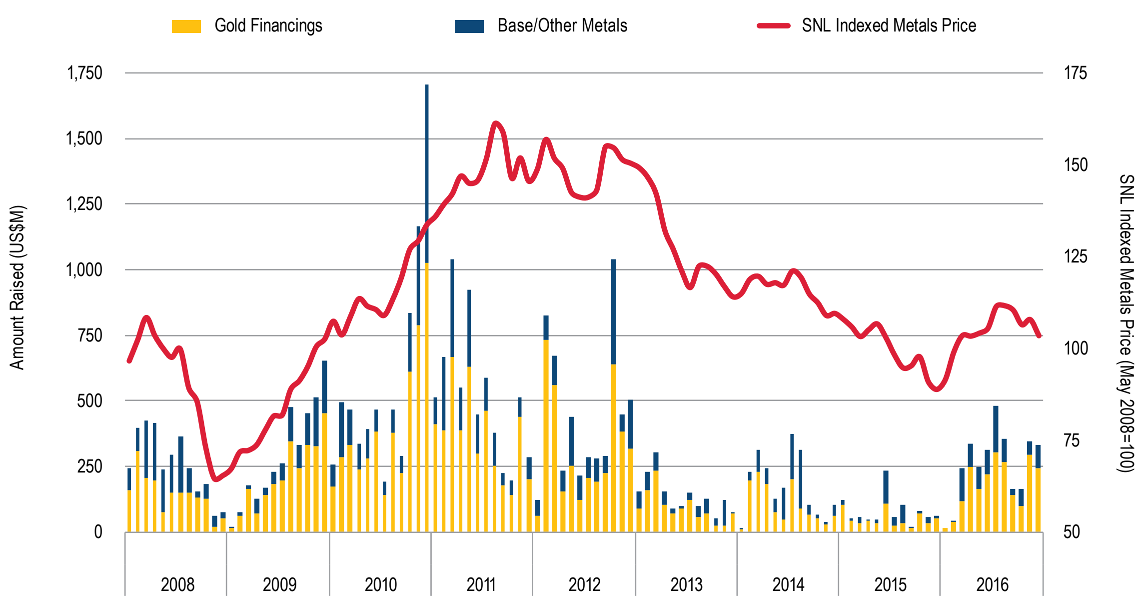
At the individual company level, Freeport-McMoRan had the largest budget decrease, down 49% from US$102 million actually spent in 2015. The company's balance sheet also benefited last year from the sale of its 70% interest in TF Holdings to China Molybdenum, and the US$1.5 billion raised from a share sale.

Brazilian major Vale SA recorded the second-largest budget decrease in 2016, with an exploration allocation that was US$46 million less than its actual exploration spending in 2015. Brazil received the largest country allocation, at US$76.5 million, with base metals accounting for 65% of the company's budget, including US$51.5 million for copper and US$41.5 million for nickel.

South Africa-based Gold Fields registered the largest budget increase in 2016, up 22% from the US$102.7 million budgeted in 2015 (only US$97.6 million was actually spent). About 55% (US$68.8 million) of the 2016 budget was for near-mine exploration, almost entirely in Australia, with a small amount allocated to Ghana.

Australia's OceanaGold had the second-largest budget increase with an allocation that was US$26 million higher than in 2015. The company is focused on minesite gold exploration in New Zealand, the Philippines and the U.S.

## Figure 2: Significant Exploration-Related Financings by Juniors and Intermediates




Notes: In this report and the Monthly Industry Monitor publication, silver and PGM are included in the Base/Other Metals category to allow a clear picture of the unique trends in gold exploration.

Exploration-related financings include financings by junior and intermediate companies of US$2 million or more, where the company indicated that all or most of the proceeds were for exploration. The financing data only covers precious and base/other metals, which account for most of the exploration spending covered by the CES report.

## Regional Targets

Although all regions showed lower allocations in 2016, Latin America's share, driven partly by a continuing focus on near-mine exploration, remained at 28% of the global total. Six countries—Chile, Peru, Mexico, Brazil, Argentina and Colombia—accounted for 92% of the Latin American exploration allocation, and, for the second year in a row, gold was the continent's top exploration target, with 44% of the total. The share devoted to base metals was down to 38% from 40% in 2015.

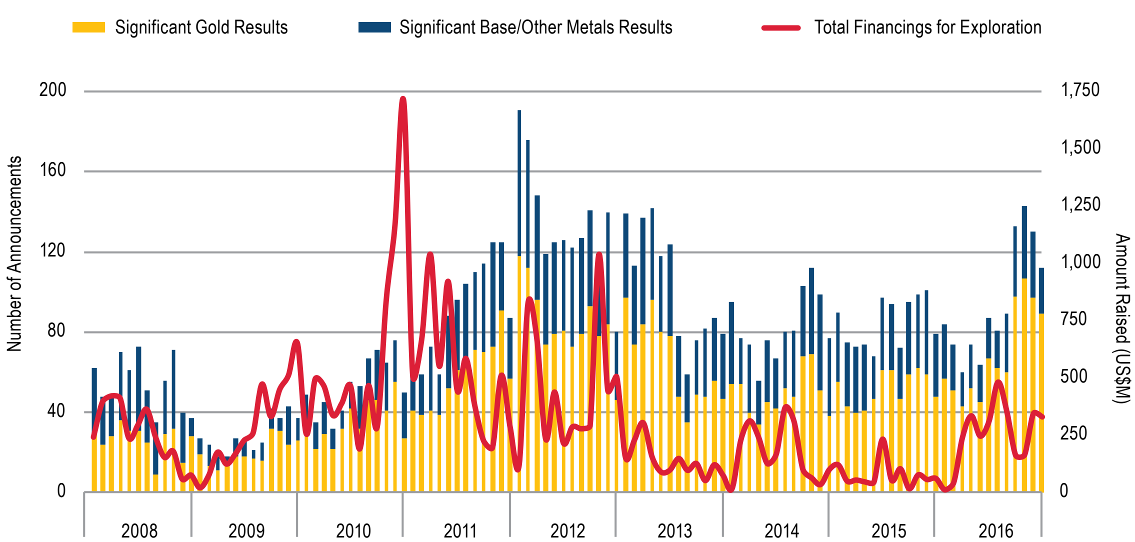
Canada was the most popular national target, accounting for 14% of the global total. Ontario accounted for 23% of the overall Canadian exploration budget, followed by Quebec with 18%. Despite a 19% fall in its allocation, gold still accounted for 50% of the Canadian budget. Planned spending for base metals was down more than 33% from 2015, lowering the category's share of Canada's total budget to 14% from 17%.

Africa posted the second-largest percentage decline of all regions in 2016, with the continent accounting for only 13% of total allocations. The most significant African exploration destinations included Democratic Republic of Congo (DRC), South Africa, Burkina Faso, Mali and Tanzania.

A continued focus on West Africa (Burkina Faso in particular) gave gold the continent's largest allocation in 2016, with the metal's share of overall African budgets jumping to 51% from 43% in 2015. Led by reduced allocations for DRC, budgets for base metals were down 35%, lowering its share of overall budgets to 23% from 27% in 2015.

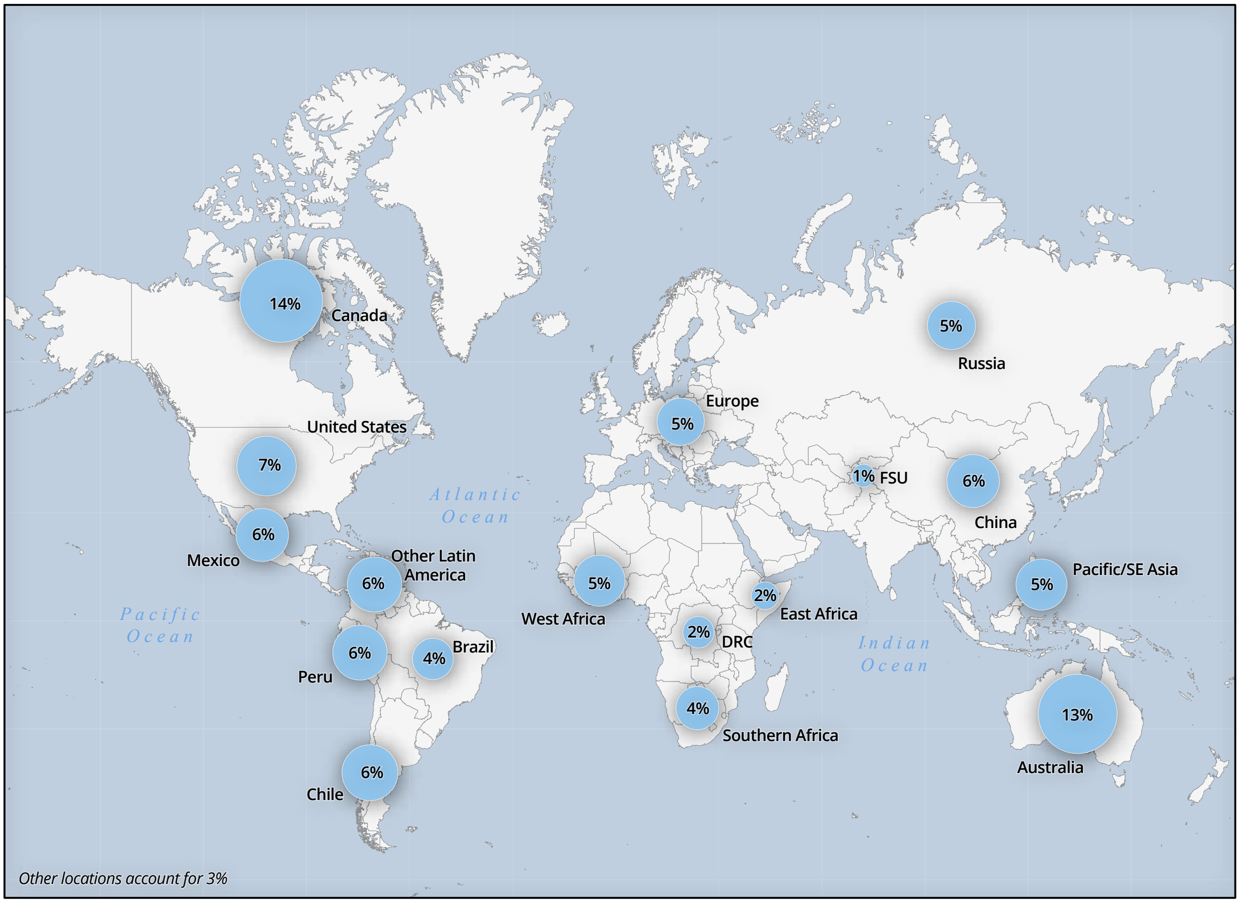
Australia accounted for 13% of the global exploration budget in 2016, with its total allocation down just 16% from 2015. Western Australia was again by far Australia's most popular exploration destination, with 62% of the country's total, and gold remained the top exploration target. Although allocations were virtually unchanged in 2016, gold's share of Australia's total budget jumped to 57% from 48% in 2015. The strong showing was mainly due to a 39% decrease in the base metals budget, whose share of the total fell to 25% from 35% in 2015.

### Figure 3: Significant Gold and Base/Other Metals Drill Results




Note: As defined in S&P Global Market Intelligence's Monthly Industry Monitor, significant drilling includes initial finds, new zones or satellite deposits, and extensions to existing mineralization—essentially any drilling that adds to the resource potential of a particular project or deposit.

## Top Destinations




The U.S. 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 U.S. budget, with two other states, Arizona and Alaska, together accounting for a further 22% of the total.

## Commodity Targets

Gold remained the top-explored commodity in 2016, with the yellow metal expanding its share by 3% compared with 2015. Gold accounted for 48% of the global exploration budget in 2016, matching the record high of 2011. However, in dollar terms gold exploration declined to its lowest level since 2006, dropping US$643 million, or 16.3%, to US$3.30 billion.

Base metals was a distant second with 31% (US$2.11 billion) of the total, followed by “Other” targets with US$828 million, or 12% of the total. Allocations for diamonds and uranium each accounted for 4%, while platinum group metals accounted for just over 1%.

Australia overtook Canada as the top gold exploration destination for the first time since 2003, with a budget of US$510 million in 2016, which represented a rare increase over 2015 among countries.

The focus on minesite exploration was even more prominent in Australia, with 52% of the country’s gold total targeted for exploration at and near existing mines. Despite this emphasis on existing gold mines, Australia was again the top destination for grassroots gold exploration, attracting 16% of the global grassroots budget.

By contrast, Canada’s gold exploration declined by nearly US$110 million to US$487.2 million in 2016, while its overall share of minesite exploration decreased substantially to 24% from 42% in 2015. Canada’s gold exploration focus shifted to late-stage projects, increasing from 38% in 2015 to 53% in 2016.

Latin America remained the top regional destination for gold, with a budget of more than US$849 million, or 26% of the total gold budget. Within Latin America, Mexico attracted the largest gold allocation, followed by Chile, Peru and Colombia.

The overall gold budget of junior companies was down sharply again in 2016, falling 28% from 2015, while intermediates trimmed 15% off their gold budgets and majors’ budgets declined by 7%. Government/other companies budgeted US$81 million less for gold than in 2015, a decline of almost 42%.

In dollar terms, the largest declines were again among the base metals. Exploration budgets for copper, nickel and zinc-lead were down a total of US$804.1 million in 2016, a 28% drop from 2015. Budgets for copper fell by 28% and for nickel by 38%, based on declines of US$574 million and US$140 million, respectively, from 2015.

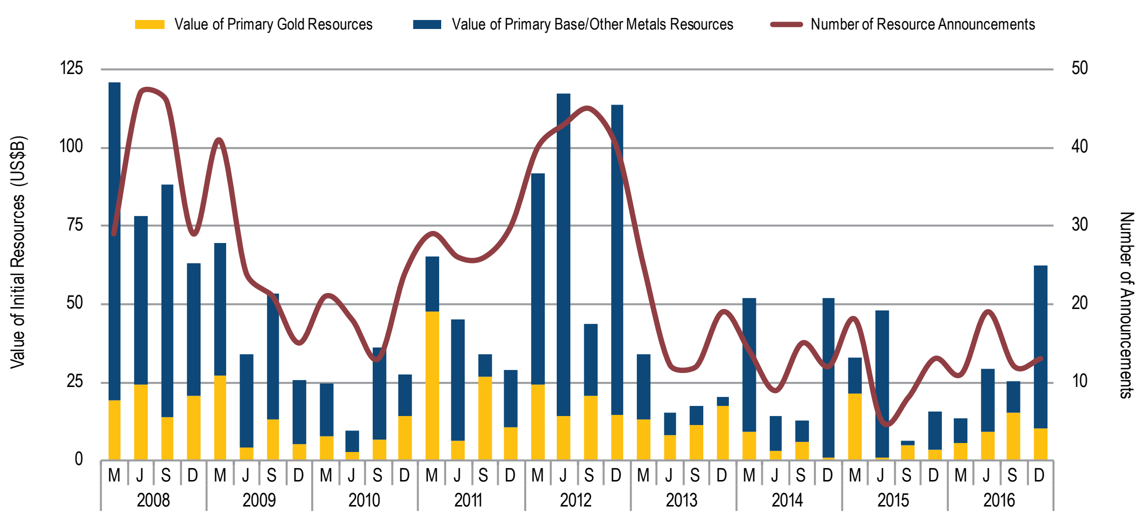
Zinc-lead budgets were only slightly more stable year on year, with a decline of 19% (US$90 million) to US$380 million in 2016.

# State of the Industry

With the low level of exploration at earlier-stage projects in recent years, it is no surprise that initial resource announcements have been declining. As Figure 4 demonstrates, the number and value of initial resources peaked in 2008 and again in 2012. The steep decline after the 2008-09 financial crisis has been surpassed by the low numbers of new deposits announced in recent years.

Persistent uncertainties and financing difficulties resulted in the announcement of 55 initial resources in 2016, compared with 44 in 2015 and 168 in 2012. According to S&P Global Market Intelligence's methodology, the value of 2016's initial resource announcements was US$130.4 billion, up 26% from US$103.2 billion in 2015, but well short of the US$366.5 billion valuation achieved in 2012.

## Figure 4: Initial Resource Values

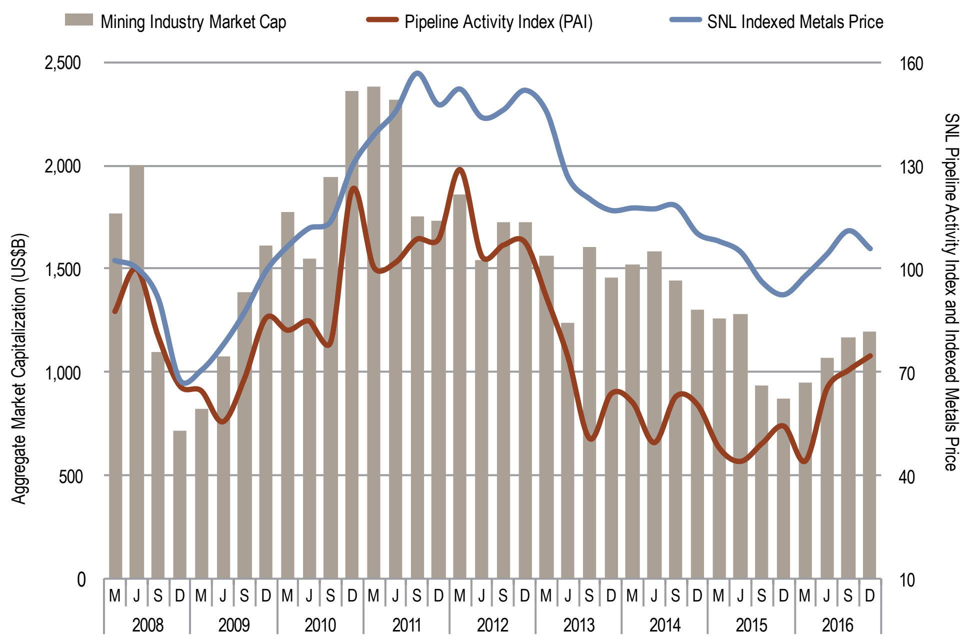



Note: As defined in S&P Global Market Intelligence's Monthly Industry Monitor, initial resources include initial estimates for both new deposits and new zones at mines and projects with previously defined reserves and/or resources.

S&P Global Market Intelligence's Pipeline Activity Index (PAI) is a valuable measure of exploration and development activity in the international mining industry. It incorporates data on the number of projects where significant drill results have been announced, initial resource statements, exploration financings and positive project milestones.

The PAI slumped in early 2015, and hit a low in April. The index rebounded in the middle of 2015 before retreating again at the end of the year. After a poor first quarter of last year, the PAI rose steadily throughout 2016 in line with the improving metals prices (see Figure 5).

## Figure 5: PAI and Market Cap




The improved performance of the PAI in 2016 was reflected by improvement in the market capitalization of the industry's listed companies. At the end of last year, the 2,467 listed companies in the SNL Metals & Mining database had a combined value of US$1,198 billion, compared with the investor valuation of under US$800 billion in January 2016.

# About S&P Global Market Intelligence

S&P Global Market Intelligence integrates financial and industry data, research, and news into tools that help track performance, generate alpha, identify investment ideas, understand competitive and industry dynamics, perform valuation, and assess risk. Our metals & mining solution offers the industry's only complete source of global exploration budgets, reserves replacement analysis and other in-depth asset level metrics for mining properties, projects, companies and mines worldwide. From worldwide exploration, development and production to strategic planning and acquisitions, our unbiased research provides insightful perspectives to power your mining analysis.

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