

Gold in an era of drones, deep mines, and dedollarization

While gold does not tarnish or decay, the industry that mines, refines, and fashions the yellow metal is far less stable.



In this episode of the *McKinsey Podcast*, Simon London speaks with McKinsey partner Oliver Ramsbottom and consultant Greg Callaway about the volatility of gold pricing and the future of gold mining.

Simon London: Hello, and welcome to this episode of the *McKinsey Podcast*, with me, Simon London. Today, we're going to be talking about gold: as a commodity, as a financial asset, and most of all, as an industry. Now, you might imagine that digging gold out of the ground would be easy money. Far from it. For one thing, the gold price is extremely volatile; for another, mining companies are having to look harder—and dig deeper—to find new deposits. They're also under increasing pressure to minimize carbon emissions and environmental impact.

For this conversation about the complex economics of the gold sector, I spoke with McKinsey partner Oliver Ramsbottom, who's based in Hong Kong, and knowledge expert Greg Callaway, who's based in Johannesburg. Oliver and Greg, thanks so much for joining, and welcome to the podcast.

Greg Callaway: Great to be here.

Oliver Ramsbottom: Thank you very much. Happy to talk about gold, one of my favorite commodities.

Simon London: For those of us who aren't close to the industry, maybe we should start with a little bit of scene setting. Oliver, maybe tell us the story of the last few years. What's been happening to the gold price, and how have gold-mining companies responded?

Oliver Ramsbottom: If you look at the gold industry over the past 20 years, it's been a roller-coaster ride. We had gold prices around \$250 per ounce—that was April 2001—rising to a peak of around \$1,900 per ounce in September 2011. Then after that period, a dramatic fall in prices.

If you look at the industry over these periods—so the 2000s and then up to 2010—it's been very different behavior. During the 2000s, as gold prices increased, this led to a dramatic increase in

the amount of acquisitions that were being done: around 1,000 deals, with a combined value of about \$120 billion, CEOs paying premiums of 30 percent and above, and a lot of capital projects being announced—around \$125 billion worth—the majority of these exceeding budgets by some significant margin.

Then of course, we have the crash in gold prices in 2011. And as a result, many companies found that they had balance sheets that were overlevered, cost structures that were bloated. This led to a dramatic period of cost-out initiatives, paying down debt, firing of exploration teams, et cetera. Also, a lot of castigation from shareholders who felt that, during this period of price fly ups, the industry CEOs and management teams had destroyed shareholder value.

This roller-coaster ride has continued through today. Gold prices are starting to rise, and many management teams are thinking, "Is the industry now poised for growth? What should be our strategy moving forward?"

Simon London: The companies have repaired themselves financially, the gold price is on the up again, and the question in the boardrooms is, "Where do we go from here?"

Oliver Ramsbottom: Exactly. Shareholders are saying, "Have management teams learned the lessons from the past?" If you look at the industry today, it's in a much healthier condition. Hence, people are now saying it's ready for growth.

Shareholders are still quite frustrated because they look back at that period of massive M&A and, frankly, shareholder destruction. Many of the shareholders, the hedge funds, are saying, "Look, we don't want to repeat the mistakes of the past," and are warning CEOs. As a result, many CEOs and management teams are somewhat wary about following that previous course of M&A in order to achieve growth, notwithstanding several large acquisitions that have happened over the past six months.

Simon London: Before we double click on what the companies could and should be doing going forward, let's just talk a little bit about the gold price. Now, as you said at the beginning, we were down at \$250 an ounce in the late '90s, early 2000s. It went as high as \$1,900 an ounce, sort of by 2011, halved back down again to about \$1,000 an ounce, and that went back up to \$1,500 an ounce. It is an incredibly volatile business environment in which to try and operate. What drives prices through these wild swings?

Oliver Ramsbottom: It's a great question, and it's one we're being asked a lot at the moment. People are asking us, what's our forecast on gold price? But actually, what sets gold price? How is it actually derived?

It's a very interesting question because many people say, unlike typical commodities that have their prices driven by simple supply and demand balances, gold is different. It's a financial commodity. As a result, those typical relationships of supply and demand don't really apply.

Our view is more nuanced. We actually think it's a reflection not only of supply and demand but also of macroeconomic factors. On the one hand, you have traditional demand in the form of jewelry, in the form of industrial applications. You have financial demand in terms of people putting their assets into ETFs [exchange-traded funds], financial coins, and then obviously, central-bank purchases, as well.

It's those two different factors that play in—that help drive the gold price. We've certainly seen that over the past two or so years, where you've seen gold prices react to movements in the interest rate by the Fed [Federal Reserve Board] and also gold prices move notably up on the back of economic uncertainty, be it around the US economy, be it around the Middle East—or the geopolitical environment.

Greg Callaway: I think what's really interesting about gold prices, if you look historically—and we've run the analysis over the last 50 years—is

when, in real-dollar terms, gold prices hit around \$1,700 per ounce, both in the early 1980s as well as in the early 2000s. These were periods of incredible stress within the global economy.

The 1980s followed the first oil crisis in 1974 and then the second in 1980. This drove hyperinflation. The stories of people queuing for kilometers on end in the US are widely told. Similarly, if we move to 2011, what really drove prices up here were the negative yields and low interest rates—in many cases negative. It's typically when you see those stress factors coming through, and it's not necessarily the same ones at a particular point in time that move prices up.

As investors look for new investments, away from equities and bonds, they tend to move into gold as a safe haven.

Oliver Ramsbottom: I think there's just one other factor that we think is going to be interesting to monitor moving forward, which is dedollarization. We're aware that, over the past 50 or so years, the dollar has been the reserve currency, and the commodities have been priced in dollars.

What we're seeing, potentially, is a move to dedollarize the global economy. We think that that's going to increase the role that gold has: maybe not moving back to a gold standard but certainly having a larger role to play, which we think would be positive for gold prices.

Simon London: Okay, so let's segue back to the companies. They've been on this roller-coaster ride—partly to do with the gold price, partly of their own making, to a degree, as well—just coming out of a period of retrenchment and cost cutting now. If you look forward, what are the big challenges that they're facing today? What are the conversations going on in the boardrooms?

Oliver Ramsbottom: I think there are two challenges.

The first of these is just about productivity improvements. Again, if you look back over the past five to seven years, the gold industry was all

about taking cost out of the business structure, deleveraging the balance sheet. That has broadly been achieved. Many of the mining companies and gold-company management teams are saying, “What’s going to drive the next wave in productivity?” Our belief is that it has to come from digital—the use of advanced analytics, digital capabilities, to further streamline and further optimize processes, cost structures, et cetera.

The second issue that the gold companies are facing is really about reserves. It’s a classic conundrum in the mining industry: you’re obviously producing from your reserves, so you need to continue to build reserves in order to keep production at the same levels or to increase it.

What we’ve seen in the mining industry—in the gold industry, in particular—over the past five to seven years is, as exploration budgets and investment into exploration were cut, mining companies were basically digging into or exhausting their existing reserves. What we see today is that the reserves that they have on their books are around 25 percent lower than they were back in 2012—and, in reality, are at 2007 levels. In simple terms, cutting back on exploration over the short term is creating a problem for the long term.

Simon London: Is this really a function of just spending less on exploration? Or is there a sense here of, like, the easy gold fields have been found, and it’s just become harder to find big fields?

Oliver Ramsbottom: This is very interesting. If you look at the historical track record of exploration, what we saw was, between the 1970s and 1990s, it was really a golden age for exploration. There was at least one \$50 million-ounce gold-deposit discovery each decade and at least ten \$30 million-ounce deposit discoveries.

What we’ve seen since the 2000s is that discovery find rate has really dropped off. In fact, the industry has failed to find any \$50 million-ounce and above deposits or, indeed, \$30 million-ounce and above deposits. What we’re seeing is that it’s

getting harder and harder to find these significant gold reserves and deposits.

Greg Callaway: I think the industry went through a structural change in the 2000s in which companies learned that the return on investment when looking for these greenfield projects was significantly low and pushed much of that burden to junior explorers. Junior explorers with tight funding—particularly when you see downward pressure being put on them—have left the market, which has left a void.

At the same time, your major gold companies moved from a methodology of looking for these greenfield projects to looking around their existing assets and exploring the brownfield opportunities. That hasn’t led to any significant resources and reserves being identified.

There is slowly a shift and a realization by the industry that it needs to look in new areas, undiscovered areas. I think this will lead to more exploration being done in places like Africa, Russia, and Asia, as mining companies look for the next big deposit.

Simon London: I’m kind of wondering, is there a sense in which technology could play a big role in exploration and certainly help to solve this looming—maybe reserve crisis is a bit too strong—but this tension around reserves? What are you seeing out there in the field, Greg?

Greg Callaway: I think there’s a couple of things.

One is about being able to identify new opportunities and developing reserves and resources. Newmont Goldcorp, for one, is looking at the historical data at Red Lake, applying advanced analytics, crunching through the numbers again, to generate new and improved insights that’ll hopefully get better results. To a similar extent, looking at extending the boundaries, Ryan’s Showing Target from White Gold in Canada is taking new approaches—using drones, for example—and trying to quickly identify where resources and reserves can be developed. That’s the one side of things.

The other side of things is going further underground. Historically, reserves and resources have been identified at 300 meters and more below the surface. The next wave is to look at geothermal factors, looking at underground riverbeds and the various dynamics and intrinsic factors within them, to possibly use as lead indicators as to whether gold is going to be found at depth. I think, going forward, we're going to be seeing more effort being placed in this space.

Simon London: More one-kilometer-plus-deep gold mines instead of the sort of 200–300-meter-deep gold mines.

Greg Callaway: Absolutely.

Simon London: That's on the exploration side. What about on the production side? Is it the same story, with a lot of advanced analytics being deployed? Or are there other approaches that you see out there that are technologically interesting and promising?

Greg Callaway: Well, productivity in the gold industry over the past 14 years has declined significantly—roughly around 30 to 40 percent from its peaks. The industry, while it has seen improvements in recent years, has had to make a step change in the way it thinks about trying to extract material from the ground.

We're seeing—if not from all our clients, then the majority of them—talk about digital and analytics, automation, and how to better operate their mines. This is everything from looking at predictive maintenance to trying to reduce costs to asking how you move into a more autonomous space to removing people from the mine face—particularly where you see the highest risk of fatalities and injuries—and getting efficiencies in automating and running machinery in a more efficient manner.

Simon London: The name of the game here is to get your cost base down: your cost per ounce, get it down as far as possible to give you more margin and more flexibility for when the inevitable downswing in the gold price comes.

Greg Callaway: Absolutely.

Oliver Ramsbottom: I think the gold industry is very similar to other mining sectors, which typically have lagged behind more technologically advanced industries in the B2C area. What we are seeing, though, broadly across the mining sector, is a greater adoption of technology—advanced analytics, digitalization, et cetera—as management teams look for that new wave of productivity.

You're seeing it all through the value chain. You're seeing it both in terms of processing—so increasing throughput and recovery in plants—through advanced analytics. You're also seeing it in terms of the mining part of the value chain—improved predictive maintenance or improved use of assets, again, through using advanced analytics. You're also seeing it in the upstream part of the value chain, with exploration.

Greg already touched upon this, with the use of drones, high-resolution cameras, and stochastic models to improve the efficiency and the productivity of the investment dollars being spent in exploration.

Greg Callaway: I think one of the reasons the gold industry has adopted new approaches, technology, and advanced analytics is that the pain point for gold has been higher than other commodities, so it's been incentivized to really turn around its operations.

Simon London: How does sustainability play into all of this? I think it's fair to say that the gold-mining sector is an extractive industry. It doesn't have the best reputation on environmental issues. Are the companies facing more stakeholder pressure, and what are they doing about it?

Greg Callaway: One particular point—as gold-mining companies are highly energy intensive—is moving away from coal-fired electricity to solar. Sibanye-Stillwater in South Africa would be a good case in point. It's looking to develop a solar plant right next to its Driefontein operation in order to supply power.

Oliver Ramsbottom: I would add to what Greg is saying in that, historically, the focus on sustainability was really about license to operate, which was about community relations—making sure that there is enough of the local community working in the mines and the processing plants, local sourcing, et cetera.

I think the focus is starting to become stronger on sustainability in terms of environmental protection. CEOs are announcing what the targets are for reducing CO₂ emissions—and those are going out in investor presentations, et cetera—and thinking about carbon footprints. Then of course, the gold industry has a bad reputation when it comes to environmental degradation through cyanide leaching. You're seeing some technology advancement there, like cyanide-free gold leaching. CEOs and management teams, I think, are being held to account a lot more in terms of the environmental footprint, the carbon footprint, that their operations engender.

Simon London: What about recycling here? We know that gold doesn't tarnish—it doesn't decay. That's one of the reasons it's been valued through the ages. Do circular-economy principles play a big role here? Is the flow of previously used gold back into the system significant?

Greg Callaway: Recycling's a very interesting topic—and a topic that gets put forward to us quite frequently. Roughly 190,000 tons of above-ground stocks currently exist within the market. Most of this is toward the jewelry sector because of what is being held by people globally. There are also some that are being held by investors—you know, retail, financial, and in the space of ETFs and central banks.

Now, why this is interesting is that the above-ground stocks significantly outweigh what is currently consumed on an annual basis. The gold industry currently consumes between 4,000 and

4,500 tons of gold in a given year. About half of that comes through jewelry, and about two-thirds within that space is particularly linked to Chinese and Indian jewelry consumption. Theoretically, you could have a situation in which no mined supply is needed, and all of your demand can be pulled from what's being held in above-ground stocks.

Simon London: Just make sure I've got the math right here. We've got about 190,000 tons above ground, which, because gold does not tarnish or decay, is probably close to the sum total of the gold ever mined. Then, on the other hand, demand for gold in a year is only about 4,000 tons. As you say, in principle, if a lot more gold came back onto the market, we wouldn't need to mine anything for years.

Greg Callaway: Now, we've run an analysis looking at what's historically happened, and there are two interesting insights here.

One is that recycling peaked in the 2000 to 2011 period, when gold prices rose to roughly around \$1,750. About 1,400 tons of gold reentered the market at that point in time. If we look at the jewelry stock over time, only about 1 to 2 percent of annual jewelry stocks ever return. We see that there's a "stickiness" to recycling. In short, will we ever see a situation where recycling will feed the full requirements of demand in any given year? Highly unlikely. Theoretically, it could play out, but I think we will see a situation where it'll be a more important role within the gold industry going forward.

I think the interesting story when it comes to sourcing gold is Rajesh Exports, which is the largest manufacturer of gold jewelry globally, based in India and Singapore. In order to secure this supply, it has recently bought out Valcambi, the largest refiner in Switzerland. There've also been talks of it purchasing mines in Australia—so controlling the full value chain in order to secure from the source as well as the manufacturer and then supply into the various markets that it is active in.

Simon London: Interesting. An example of vertical integration in gold, right up through to the jewelry space.

Greg Callaway: Absolutely. Coming back to your point, because the above-ground stocks are not as fluid as people would think, you need to source more and more gold on an annual basis, which comes from our mines globally.

Simon London: All right, I think that's all we have time for today. But thank you, Oliver, and thank you, Greg, for a fascinating conversation.

Oliver Ramsbottom: You're most welcome.

Greg Callaway: See you next time.

Simon London: And thanks, as always, to you, our listeners, for tuning in to this episode of the *McKinsey Podcast*. To learn more about metals, mining, advanced analytics, automation, and more, please visit us at [McKinsey.com](https://www.mckinsey.com) or download the splendid McKinsey Insights app.

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