Silver Linings Playbook

In this report, we explore investment prospects for silver and silver equities. Historically, the silver sector has been under-followed and poorly understood, contributing to silver's status as the most enigmatic of precious metals. We attribute silver's thin analytical legacy to three fundamentals. First, silver's investment utility is bifurcated between industrial and quasi-monetary functions which do not always move in concert. Second, silver rarely occurs in its native form, and is primarily produced as a byproduct of lead, zinc, copper and gold mining. Therefore, the majority of silver supply accrues from an array of mines and companies which defies simple analysis. And third, the silver market's small size has kept silver below the radar of major investment banks on Wall and Bay Streets.

In recent years, silver's low profile has combined with constrained liquidity in precious-metal capital markets to compress valuations of silver projects across the market-cap spectrum. Because we believe the industrial and monetary components of silver's investment proposition are aligning strongly, we view depressed silver valuations as an exceptional investment opportunity.

Silver ≠ Gold

Similar to "oil & gas," "gold & silver" are generally perceived as a functional pair. Separated primarily by price, silver has long served as "poor man's gold." Beneath this linked profile, however, gold and silver are as profoundly different as they are similar. On the like side of the equation, both gold and silver are malleable, ductile, lustrous and non-corrosive, making them preferred metals for jewelry and cultural artifacts. From here, however, attributes of gold and silver diverge quite a bit.

The defining difference between gold and silver is comparative rarity. Gold is 18 times more precious than silver, occurring in the earth's crust at just four parts-per-billion versus silver's 75 parts-per-billion. Combined with the fact that gold's density (19.2 g/cm^3) is twice that of silver (9.3 g/cm^3), gold is the far more functional monetary metal. In vivid demonstration of gold's unrivaled utility as a monetary reserve, the 212,500-tonne total of all gold ever mined in recorded history (now worth $15.9 trillion) could fit in ***one cubic tennis court!***

In contrast to gold's passive role as immutable store of value, silver exhibits unique physical properties making it the ideal metal for an array of industrial applications. Largely due to silver's delocalized 5s valence electron atop its 4d orbital shell, silver boasts the ***highest electrical conductivity, highest thermal conductivity and highest reflexivity of any metal***. Therefore, silver is a valuable component in a wide range of precision electronics, from microchips to motor vehicle circuitry. As shown in Figure 1, on the following page, industrial uses accounted for 57% of total 2023 silver demand (versus just 6% for gold) with the balance of demand accruing from direct physical investment (20%) and quasi-investment categories such as jewelry (17%), silverware (5%) and hedging (1%).

Importantly, silver's industrial and investment fundamentals can occasionally be at odds with one another. Regardless of the monetary backdrop, silver's industrial demand is more vulnerable to economic recession and financial market turmoil than gold. However, when silver's industrial and investment fundamentals are aligned, as they are in 2024, silver performance tends to be more explosive than gold.

Figure 1. Global Silver Market Supply and Demand (2015-2024E)

Million ounces	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024F**	**2023**	**2024F**
Supply												
Mine Production	896.8	899.8	863.6	850.6	837.2	783.4	829.0	836.7	830.5	823.5	-1%	-1%
Recycling	147.0	145.7	147.2	148.7	148.2	164.3	173.7	176.9	178.6	178.9	1%	0%
Net Hedging Supply	2.2	--	--	--	13.9	8.5	--	--	--	--	--	--
Net Official Sector Sales	1.1	1.1	1.0	1.2	1.0	1.2	1.5	1.7	1.6	1.5	-6%	-9%
Total Supply	**1047.0**	**1046.5**	**1011.8**	**1000.5**	**1000.3**	**957.4**	**1004.3**	**1015.4**	**1010.7**	**1003.8**	**-1%**	**-1%**
Demand												
Industrial (total)	457.1	489.5	526.4	524.2	523.5	509.7	561.3	588.3	654.4	710.9	11%	9%
Electrical & Electronics	272.3	308.9	339.7	331.0	327.3	322.0	351.2	371.3	445.1	485.6	20%	9%
of which photovoltaics	59.6	81.6	99.3	87.0	74.9	82.8	88.9	118.1	193.5	232.0	64%	20%
Brazing Alloys & Solders	51.1	49.1	50.9	52.0	52.4	47.5	50.5	49.2	50.2	51.8	2%	3%
Other Industrial	133.7	131.5	135.8	141.2	143.8	140.2	159.6	167.8	159.0	173.5	-5%	9%
Photography	38.2	34.7	32.4	31.4	30.7	26.9	27.7	27.5	27.0	26.1	-2%	-3%
Jewelry	202.5	189.1	196.2	203.2	201.6	150.9	182.0	234.5	203.1	211.3	-13%	4%
Silverware	58.3	53.5	59.4	67.1	61.3	31.2	40.7	73.5	55.2	58.8	-25%	7%
Net Physical Investment	309.3	212.9	155.8	165.9	187.4	208.1	284.3	337.1	243.1	212.0	-28%	-13%
Net Hedging Demand	--	12.0	1.1	7.4	--	--	3.5	17.9	12.2	--	-32%	--
Total Demand	**1065.4**	**991.8**	**971.3**	**999.2**	**1004.4**	**926.8**	**1099.6**	**1278.9**	**1195.0**	**1219.1**	**-7%**	**2%**
Market Balance	-18.4	54.7	40.5	1.3	-4.1	30.6	-95.4	-263.5	-184.3	-215.3	-30%	17%
Net Investment in ETPs	-17.1	53.9	7.2	-21.4	83.3	331.1	64.9	-125.8	-42.1	50.0	-67%	--
Market Balance less ETPs	**-1.3**	**0.8**	**33.3**	**22.7**	**-87.4**	**-300.5**	**-160.3**	**-137.7**	**-142.2**	**-265.3**	**3%**	**87%**
Silver Price (US$/oz. London price)	15.7	17.1	17.1	15.7	16.2	20.6	25.1	21.7	23.4	--	7%	--

Source: The Silver Institute; Metals Focus

Multi-Tasking Metal

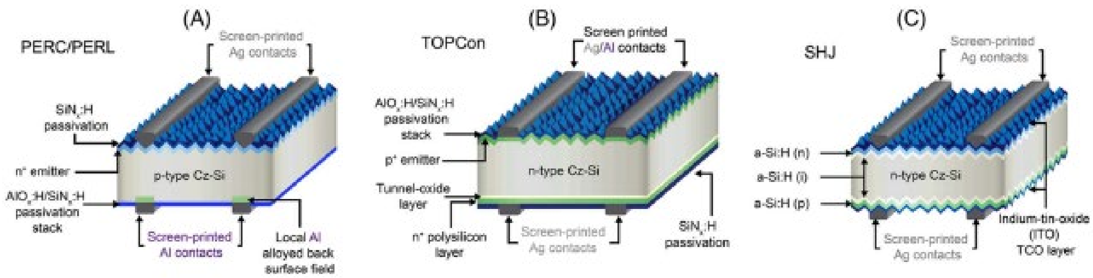
The renewable energy transition has become the dominant investment theme of our generation. ***Everyone*** knows copper is a key metal in the electrification trend, but few recognize the critical role silver plays in maximizing performance and efficiency of solar panels, batteries and EV electronics. In all of these applications, silver's unrivaled electrical conductivity makes silver the ideal metal for interconnections and contact points. While there are hundreds of specialized silver applications in the electrical/electronics industry, we narrow our focus in this report to the photovoltaic cells at the functional heart of solar panels.

Wood Mackenzie estimates that 417 gigawatts of new solar capacity was installed during 2023, a steep **80%** increase from the 229 gigawatts installed in 2022. Total global solar capacity has now increased tenfold during the past decade, from 140 gigawatts in 2013 to 1.4 terawatts in 2023 (26% annual growth). While 2023's blistering growth was certainly anomalous, green agendas and government subsidies (such as the Inflation Reduction Act) are likely to sustain solid solar growth rates for the foreseeable future.

While green energy proponents tend to extrapolate 20%-25% growth in future years, we expect the rate of solar installations to slow meaningfully. However, even a 15% growth rate would add considerable strain to silver industry supply. As shown in Figure 1, above, photovoltaic silver demand totaled ***194 million*** ounces in 2023, a ***64%*** year-over-year increase. From this starting point, 15% annual growth would expand photovoltaic demand to ***390 million ounces*** by 2028 (47% of total 2023 mine production) and ***785 million ounces*** by 2033 (95% of 2023 production).

In addition to annual growth in ***volume*** of solar panel installations, the ***technology*** of photovoltaic cells also continues to improve, with successive generations of solar modules being more efficient, more reliable and cheaper to produce. Briefly, the three dominant technologies of photovoltaic cells are PERC *(passivated emitter and rear contact)*, TOPCON *(tunnel oxide passivated contact)* and SHJ *(silicon heterojunction)*. Unsurprisingly, newer photovoltaic technologies are significantly more silver intensive than their predecessors.

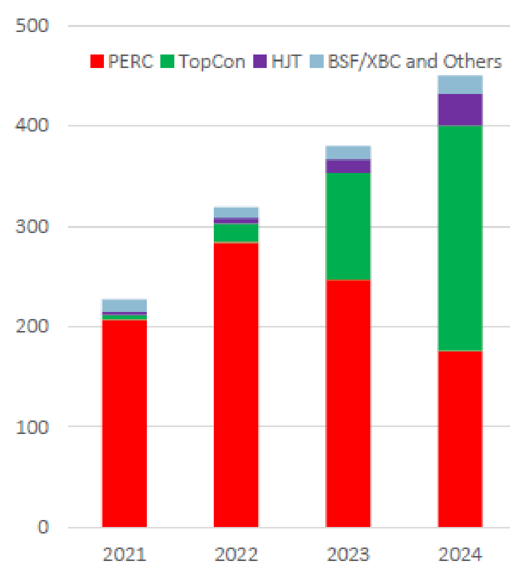
Figure 2. Schematic of Industrial Implementation for PERC, TOPCON & SHJ Solar Cells



Source: School of Photovoltaic and Renewable Energy Engineering; UNSW Sydney, December 2022

We will skip well-documented details of evolving photovoltaic technology to narrow in on relevant implications for the silver market. As detailed in Figure 2, above, successive generations of photovoltaics cells substitute silver for cheaper aluminum at various "interconnection tabs" and "front n-type and rear p-type contacts." All told, today's industry standard PERC modules require roughly ***15 mg*** of silver for each watt of productive capacity. In contrast, newer TOPCON modules require ***20-26 mg*** of silver per watt (30% - 80% more silver than PERC) and even newer SHJ solar modules require ***30-37 mg*** of silver per watt (more than ***double*** PERC silver content). Most important, as shown in Figure 3, below, volumes of more silver-intensive TOPCON and SHJ (here titled HJT) technologies are rapidly gaining traction and are projected to surpass PERC market share this year.

Figure 3. Annual Gigawatts of Installed PERC, TOPCON & HJT Solar Capacity (2021-2024E)



Source: Metals Focus

It is important to note that because silver is the most expensive material used in manufacture of solar panels, the collective brainpower of the renewables industry is always laser focused on reducing silver content through design, production and operational innovations. This industry priority, known as silver thrifting, has historically offset roughly 50% of topline solar growth on an annual basis. While thrifting will undoubtedly temper the silver demand implicit in solar growth rates we have outlined above, it is fair to say industrial silver demand is on very sound footing for the next decade.

From a pure supply/demand perspective, accelerating trends in industrial silver usage appear to be on a collision course with chronic underinvestment in silver mining capacity. Specifically, as shown in Figure 1 on page 2, since 2016, industrial demand has ***increased 34%*** while total mine production has ***declined 8%.*** Consequently, after generating a supply ***surplus*** of 123 million ounces between 2016 and 2020, the global silver market has now operated with a supply ***deficit*** of 543 million ounces during the past three years.

Above-Ground Stocks

The combination of accelerating industrial demand and declining mine production sounds like the perfect recipe for a rising silver price, yet the silver price has actually ***declined 9.9%*** during the past three years. Why has this been the case? Obviously, strengthening industrial demand is a bullish dynamic for silver markets but by no means the sole variable affecting silver prices. In fact, we would argue that the other half of silver's bifurcated utility—investment demand—is ***always*** the dominant variable in setting the silver price.

As with gold markets, annual surpluses and deficits in silver supply are always reconciled by additions to, or depletions from, above-ground physical stocks. If investment demand is low or negative, ample physical silver is readily available from above-ground stocks to satisfy even the sharpest surges in industrial demand. But when investment demand is strong, above-ground silver stocks become unavailable and industrial buyers must compete with investors to bid up the price on new industry supply. In this manner, gold and silver markets are akin to a giant, global game of poker. For the gold or silver price to rise, at every incremental price point millions of physical holders must choose not to sell, or "check." The operative question becomes, how many chips (above-ground stocks) does everyone have?

In the case of gold, due to its extremely high price and indestructible nature, above-ground stocks are generally calculated as the sum total of historically mined gold. In essence, ***all*** the gold mined since the Egyptian pharaohs is still around in some form or another—in vaults, in jewelry boxes, in museums or in teeth—so all of it is potentially available at ***some*** price.

In contrast to gold, it is notoriously difficult to measure above-ground silver stocks. Since 50%-60% of mined silver has historically been dedicated to industrial and photographic uses, the majority of mined silver has been consumed, never to be reclaimed in the above-ground stock. And due to silver's far lower price point, it is much harder to estimate the percentage of silver jewelry, artifacts and silverware which might hurdle emotional attachments to become available for recycling during silver price spikes. So, what's left? Well, no one really knows!

As with many investment topics, analysts and financial commentators tend to focus on the easiest volumes to quantify. Rather than wrestle with comprehensive analysis of the various components of above-ground silver stocks, industry analysis overwhelmingly focuses on physical inventories at the four primary global exchanges: London Bullion Market Association (LBMA), Chicago Mercantile Exchange (CME), Shanghai Gold Exchange (SGE) and Shanghai Futures Exchange (SHFE). At year-end 2023, these exchanges held 1.219 billion ounces of physical silver bullion, down from 1.702 billion ounces in 2020. Because these "identifiable inventories" have declined ***483 million*** ounces during the same three-year span in which the silver industry supply deficit totaled ***543 million*** ounces, there has been a tendency to conflate the two series into the conclusion that industrial silver demand is directly depleting exchange reserves.

Further, it is well known that the high-profile 1.2 billion-ounce total of exchange inventories includes 500 million ounces of silver already owned by bullion ETF's and another 500 million-or-so ounces required for minimum exchange reserves. Therefore, there has been growing speculation that another year or two of strong industrial demand might trigger a silver supply squeeze and resultant price spike. While nothing is impossible, we find it unlikely that industrial demand could trigger a silver supply squeeze in the absence of a coincident surge in investment demand, and it is important to convey our reasoning. We believe excessive focus on exchange inventories significantly understates above-ground silver stocks and in the process does silver a disservice by discounting silver's quasi-monetary value. Let us explain.

Truth be told, we believe the 1.2 billion-ounce exchange total understates the world's liquid physical silver stocks by at least 80%. First of all, during the past decade of government sanctions and geopolitical tensions, no industry has experienced faster growth than private vaulting. Building on the legendary amount of silver held in Swiss vaults, we are confident there are ***multiples*** of LBMA inventories held in unreported depositories and private vaults around the globe. Second, we would estimate at least two or three billion ounces of silver are held in bar or coin form by ***individual*** investors. Throwing in non-LBMA-custodied ETF's and residual government holdings, we would estimate liquid above-ground stocks of refined silver total at least ***6 billion*** ounces.

And these figures do not even ***begin*** to estimate the amount of silver jewelry and silverware held around the world (especially in India), all of which is technically eligible to be recycled on a steep price spike. For example, ***62 million*** ounces of jewelry, silverware and coins were recycled from above-ground stocks in 2023, even following a three-year price decline.

We suspect industry authority figures, such as the Silver Institute, tend to validate analytical focus on exchange stocks in the view that investors might misinterpret much larger above-ground stocks as overhead supply. We would suggest virtually the opposite. ***By understating the true stock of silver held around the world for investment and store-of-value reasons, such analysis degrades perceptions of silver's contemporary monetary value.***

One of gold's primary monetary attributes is its superhigh stock-to-flow ratio. Gold's 212,500-tonne above-ground stock and 3,644-tonnes of 2023 production combine for a 58-to-1 stock-to-flow ratio (incidentally identical to bitcoin's much-ballyhooed stock-to-flow ratio prior to the April '24 halving). Current speculation that the silver price is about to spike due to industrial depletion of exchange stocks ignores the billions of ounces of refined silver held by investors around the world for quasi-monetary reasons. Adding in global jewelry and silverware stocks in India and the Far East (where they are held for investment purposes), we would suggest above-ground silver stocks are closer to 15-to-20 billion ounces than they are to the 1.2 billion-ounce exchange total followed by Wall Street analysts. Perhaps we are misguided, but we view this implied 24-to-1 stock-to-flow ratio as confirmation that silver's monetary utility remains alive and well!

As final footnote to our discussion of silver's quasi-monetary role, we wanted to touch briefly on the gold-to-silver ratio (GSR), a popular metric in analyzing gold and silver valuations. Rooted in the long heritage of gold/silver bimetallism, the GSR is essentially the oldest continuously tracked exchange rate in financial history. First fixed at 12-to-1 during the Roman Empire, the GSR evolved through several European iterations before the U.S. Coinage Act fixed the GSR at 15-to-1 in 1792. Silver's final official monetary role was U.S. silver coins which circulated through the late 1960's. Between 1959 and 1971, however, the U.S. government liquidated its 3.4 billion ounces of circulating coins and silver inventory down to 170 million ounces of maintenance stock for the U.S. mint.

Our point here is that the pre-1971 GSR (including 2,000 years at 12-1), holds little bearing on today's GSR. Silver's ***official*** monetary role has long since ended and only silver bugs expect the GSR to return to the teens. Since 1971, the GSR has averaged 59-to-1, so in our view, silver is relatively undervalued when the GSR is above 59. And when silver's ***unofficial*** monetary role kicks in with its millions of individual adherents around the globe, a potential 40-to-1 GSR is certainly in the cards. At 83-to-1, today's GSR makes it a bit easier to sweat out a possible plateau in solar growth rates!

Performance Ledger

A productive exercise in assessing the portfolio utility of silver and silver equites is careful review of past sector performance. Since the onset of the 2001 precious metal bull market, which factors and fundamentals have influenced performance of silver and silver shares? In Figure 4, on the following page, we present annual performance statistics for ***spot silver*** and ***spot gold*** (measured in U.S. dollars), the ***Solactive Silver Miners Index*** (SOL), the ***ARCA Gold Miners Index*** (GDM), the ***S&P 500 Index***, and the ***DXY Dollar Index;*** as well as annual averages for ***CPI***, ***10-year Treasury yields*** and ***fed funds*** (low band).

For the record, we use the GDM Index as our proxy for gold equities because GDM is the index on which the ubiquitous Van Eck Gold Miners ETF (GDX) is based, and GDM predates GDX with fewer ETF distortions. Similarly, we use the Solactive Index (SOL) as our proxy for silver equities because Solactive is the index on which the Global X Siver Miners ETF (SIL) is based, and Solactive predates SIL with fewer ETF distortions. Because the Solactive Index was launched in mid-2006, in prior years (2001-2006) we have substituted the average performance of Hecla Mining, Coeur d'Alene Mines and Pan American Silver.

Figure 4. Annual Percentage Change of Spot Silver, Solactive Silver Miners Index, Spot Gold, GDM Index, S&P 500 Index, & DXY Dollar Index and Annual Average of CPI, 10-Year Treasury Yield & Fed Funds (Lower Band) (2001-3/31/24)

Year	USD SILV	SOL IND.	USD GOLD	GDM IND.	S&P 500	DXY	CPI	10-YR	FED FND
2001	0.43%	44.32%	2.46%	39.28%	-11.89%	6.56%	2.8%	5.00%	3.91%
2002	3.46%	221.80%	24.78%	79.69%	-22.10%	-12.76%	1.6%	4.60%	1.68%
2003	24.27%	115.76%	19.37%	47.07%	28.68%	-14.66%	2.3%	4.00%	1.12%
2004	14.86%	-16.64%	5.54%	-9.38%	10.88%	-6.98%	2.7%	4.26%	1.34%
2005	29.20%	-3.58%	17.92%	30.43%	4.91%	12.76%	3.4%	4.28%	3.19%
2006	46.40%	48.70%	23.16%	22.98%	15.79%	-8.25%	3.2%	4.79%	4.96%
2007	14.65%	23.80%	30.98%	17.58%	5.49%	-8.31%	2.9%	4.63%	5.05%
2008	-23.02%	-67.17%	5.78%	-26.34%	-37.00%	6.01%	3.8%	3.65%	2.08%
2009	48.16%	140.37%	24.37%	37.98%	26.46%	-4.24%	-0.4%	3.24%	0.00%
2010	83.21%	88.69%	29.52%	34.76%	15.06%	1.50%	1.6%	3.20%	0.00%
2011	-9.94%	-20.03%	10.06%	-15.48%	2.11%	1.46%	3.2%	2.77%	0.00%
2012	8.98%	8.97%	7.14%	-8.46%	16.00%	-0.51%	2.1%	1.79%	0.00%
2013	-35.84%	-49.69%	-28.04%	-52.18%	32.99%	0.33%	1.5%	2.33%	0.00%
2014	-19.34%	-17.46%	-1.72%	-11.71%	13.69%	12.79%	1.6%	2.53%	0.00%
2015	-11.75%	-31.98%	-10.42%	-24.55%	1.38%	9.26%	0.1%	2.13%	0.00%
2016	14.86%	80.03%	8.56%	54.57%	11.96%	3.63%	1.3%	1.83%	0.26%
2017	6.42%	1.98%	13.09%	12.45%	21.83%	-9.87%	2.1%	2.33%	0.85%
2018	-8.53%	23.51%	-1.58%	-8.39%	-4.38%	4.40%	2.4%	2.91%	1.66%
2019	15.22%	35.02%	18.31%	41.56%	31.48%	0.22%	1.8%	2.14%	2.03%
2020	47.88%	41.89%	25.12%	24.12%	18.39%	-6.69%	1.2%	0.89%	0.28%
2021	-11.72%	-17.86%	-3.64%	-8.93%	28.68%	6.37%	4.7%	1.44%	0.00%
2022	2.77%	-24.43%	-0.28%	-8.05%	-18.13%	8.21%	8.0%	2.94%	1.61%
2023	-0.67%	2.41%	13.10%	11.84%	26.26%	-2.12%	4.1%	3.96%	4.95%
Q1 2024	4.91%	-3.71%	8.09%	1.41%	10.55%	3.11%	3.2%	4.15%	5.25%
Cumulative	442.68%	807.46%	719.04%	447.33%	520.44%				

Source: Bloomberg

These statistics yield a few objective conclusions about the performance of silver and silver equities. With respect to ***spot silver***, this data supports our view that while silver prices can display correlation to economic variables such as fed funds, 10-year yields and CPI over ***short*** periods of time, these correlations always break down over the ***long run***. Additionally, these figures demonstrate that silver's negative (weekly) correlation to the U.S. dollar (-0.47) is quite similar to gold's negative dollar correlation (-0.49). Finally, as one might expect, spot silver displays very high correlation to spot gold (0.77).

With respect to ***silver equities***, this data demonstrates that the primary driver of silver share performance is the underlying performance of spot silver (0.78 correlation). While not linked at the hip, silver shares clearly do better when the silver price is strong and worse when the silver price is weak. Additionally, it is interesting to note that silver equities have consistently displayed higher beta than gold equities to underlying moves in gold and silver. Somewhat surprisingly, the linked performance of Solactive Index (including our pre-2006 HL/CDE/PAAS average) has almost doubled cumulative return of the GDM Index since 2000. And finally, while the annual figures in Figure 4 are temporally imprecise, silver shares have clearly performed best during early phases of Fed easing cycles.

Fed Pivots

In prior reports, we have observed that gold equities are among the best performing investment assets during early stages of a Fed pivot towards easing posture. We are embarrassed to admit that prior to our preparation of this report, it had never occurred to us to analyze the post-pivot performance of silver equites ***separately*** from gold equities. Having now completed this exercise, we are a bit stunned by the degree to which silver equities have consistently (4 out of 5 instances) outperformed gold equities immediately following a Fed pivot towards easing posture.

We have reproduced below our five examples of Fed pivots towards easing posture with consequent performance of the S&P 500 Index, spot gold, spot silver, the GDM Index and the Solactive Index (SOL). [As in our Figure 4 statistics, prior to formation of the Solactive Index, we substitute average performance of Hecla, Coeur and Pan American.]

On January 3, 2001, the Fed responded to the "internet" crash by cutting the fed funds rate from 6.50% to 6.00%, commencing an easing cycle which would reduce rates to 1.0%. During the following 17 months (through 5/28/02):	S&P 500 -18.76% Gold +20.92% GDM +177.87% **Silver+8.44% HL/CDE/PAAS +374.56%**
On November 25, 2008, amid the GFC, Chair Bernanke launched the nuclear option of QE1. During the following 12 months (through 12/2/09):	S&P 500 +32.76% Gold +47.90% GDM +122.32% **Silver +86.25% SOL +265.23%**
On January 19, 2016, global market stress following the Fed's 12/16/15 liftoff caused Chair Yellen to announce a pause in rate hikes. During the following seven months (through 8/12/16):	S&P 500 +17.59% Gold +22.86% GDM +147.36% **Silver +40.48% SOL +239.82%**
On December 19, 2018, Chair Powell hiked rates 25 bps. Market declines were so severe, the Fed abandoned rate hikes (January), shut QT down (June) & cut rates (July). During the nine months following the 12/19/18 hike (through 9/4/19):	S&P 500 +18.87% Gold +24.89% GDM +54.59% **Silver +34.25% SOL +33.24%**
On March 16, 2020, the Powell Fed's Covid response was to cut fed funds 100 basis points, from 1.25% to 0.25%. During the next five months (through 8/5/20):	S&P 500 +40.42% Gold +34.61% GDM +104.30% **Silver +108.83% SOL+140.95%**

Obviously, buying impulses for silver equities are subject to a powerful animal spirit when the scent of Fed easing is in the air! In our view, two fundamentals help explain the blistering post-pivot performance of silver equites. First, when the Fed is commencing an easing cycle, silver's industrial and investment prospects become strongly aligned. And second, when silver's legions of individual investors are triggered *en masse* by a high-profile Fed pivot, the limited liquidity of the silver sector can quickly be tested.

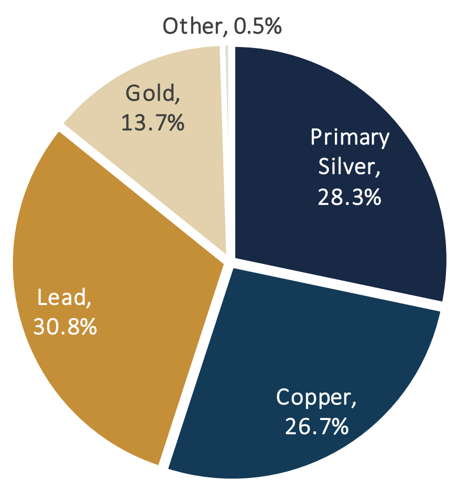
As final footnote to the above statistics, we have tailored these time frames to cast the performance of gold and silver equities in its strongest light. We recognize it is impossible to predict whether (or for how long) precious metal equities will outperform during any Fed cycle. All we are saying is that during early stages of Fed pivots toward easing posture, ***gold shares*** have historically proven to be a potent tactical investment, and the performance of ***silver shares*** has been literally off the charts. Judging from these performance statistics, it would be difficult to argue that silver equities do not currently represent a compelling portfolio allocation.

Thirteen Horsemen

At the risk of dramatizing, silver's coalescing industrial and investment fundamentals suggest that, as with cobalt in 2016 and uranium in 2021, the neglected silver industry's time has finally come. The operative question becomes how best to participate in an industry on the cusp of institutional awakening. For investors seeking equity exposure in silver markets, what are the available options? Well, here's where the silver market gets typically complicated.

Among silver's unique molecular properties is the fact that silver primarily appears in the earth's crust in base metal alloys. Therefore, the vast majority of silver is produced as a ***byproduct*** of other metal mining. In fact, as shown in Figure 5, below, just ***28.3%*** of 2023 silver production accrued from primary silver mines, with the balance being produced as a byproduct of lead/zinc mines ***(30.8%)***, copper mines ***(26.7%)*** and gold mines ***(13.7%)***.

Figure 5. Silver Mine Production by Source Metal (2023)



Source: Silver Institute; Metals Focus

Figure 6. Top-20 Silver Producing Companies (2023)

Tons	2022	2023	Y/Y
Fresnillo	1,588	1,663	5%
KGHM Polska Miedz	1,327	1,428	8%
Hindustan Zinc Ltd.	694	739	6%
Pan American Silver	574	636	11%
Glencore	739	622	-16%
CODELCO	649	596	-8%
Industrias Peñoles	495	589	19%
Southern Copper	577	573	-1%
Newmont	923	560	-39%
Polymetal Intl.	653	551	-16%
Volcan Cia Minera	445	473	6%
Hecla Mining	441	446	1%
South32	383	404	6%
BHP	364	368	1%
Boliden	377	322	-15%
Nexa Resources	310	320	3%
Coeur Mining	305	319	4%
First Majestic Silver	327	319	-3%
SSR Mining	261	301	15%
Hochschild Mining	342	296	-14%

Source: Silver Institute; Metals Focus

On a corporate level, it logically follows that the majority of silver ounces are produced by global mining majors. As shown in Figure 6, above, the top-20 silver producing companies in 2023 were heavily weighted towards diversified mega-caps. This presents a ***triple*** challenge for silver industry dynamics.

First, silver's marginal contribution to corporate cash flows at companies such as BHP and Glencore relegates silver to the backseat of corporate priorities. Therefore, capital expenditures and production plans at mines producing three-fourths of global silver are somewhat detached from silver-market fundamentals, rendering silver supply stubbornly inelastic.

Second, due to silver's byproduct status, silver exploration budgets are a fraction of what they might be if the majority of silver were produced by primary silver mines. By way of example, S&P Global estimates (in charts we have reproduced in Figure 9 in our Addenda Graphs) that total global exploration budgets during the past 15 years have averaged ***$5.5 billion*** for gold, ***$2.5 billion*** for copper, and just ***$505 million*** for silver. From analytical coverage to exploration budgets, the silver industry has been under-nourished for years.

Third, the investible universe of pure silver plays is surprisingly limited. The Solactive Silver Miners Index is composed of 32 individual companies. However, when we screen these companies for primary silver miners (minimum 25% of '23 revenues) with market caps above $500 million, we are left with the 13 companies we list in Figure 7, on the following page.

Figure 7. Market Cap. and Revenue Breakdown at 13 Primary Silver Miners (04/23/23)

		% of 2023 revenue	
	Mkt cap (US$)	**Silver**	**Gold**
Pan American Silver	$6.8 B	26%	74%
Industrias Penoles	$6.6 B	29%	33%
Fresnillo	$5.3 B	46%	41%
Hecla Mining	$3.2 B	47%	41%
First Majestic Silver	$2.0 B	42%	58%
Coeur Mining	$1.8 B	30%	70%
Aya Gold & Silver	$1.3 B	100%	0%
MAG Silver	$1.3 B	82%	14%
SilverCrest Metals	$1.2 B	54%	46%
Hochschild Mining	$972 M	38%	62%
Gatos Silver	$700 M	84%	4%
Endeavour Silver Corp.	$653 M	65%	35%
Silvercorp	$628 M	55%	3%
Total $ / Average %	**$32.5 B**	**54%**	**37%**

Source: Bloomberg

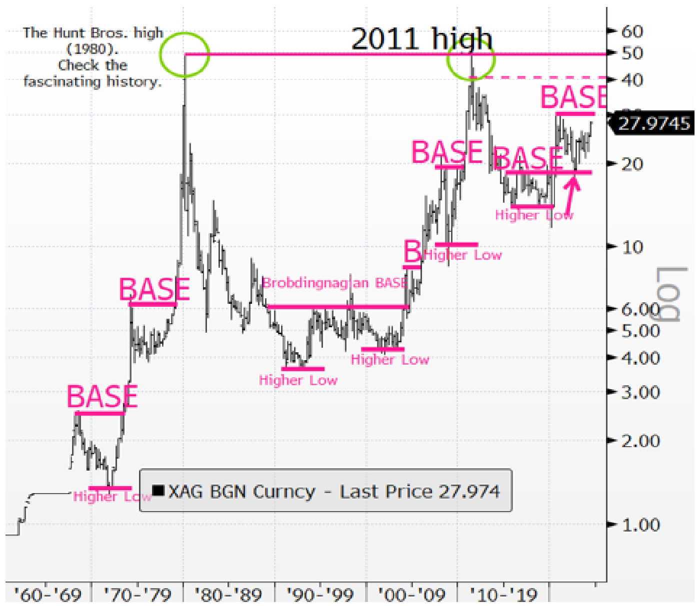
Amazingly, the aggregate market cap of these 13 companies totals just ***$32.5 billion***. And demonstrating just how precious primary silver production has become in today's world, at the 13 companies we identify as the purest plays in the silver mining industry, silver sales constitute just ***54%*** of total '23 corporate revenue! Given our expectations for silver market dynamics, we find the sheer scarcity value of primary silver mines highly compelling. Throw in strong management teams, proven capital discipline and world class deposits (here's where we can help) and we think we have identified a few homeruns!

Conclusions

The investment climate of the past 15 years has been defined by unconventional central banking (QE & ZIRP), global disinflation and the passive investing juggernaut. Unprecedented fiscal and monetary stimulus have overwhelmingly favored bonds and growth stocks over commodities and hard assets. By way of example, NVIDIA boasts a 4.5% weighting in the S&P 500 versus just 3% for the entire energy sector. And in Bank of America's February Global Manager Survey, 75% of money managers reported precious metal allocations in the range of 0%-to-1% (and 21% in the range of 1%-to-5%). We cannot recall a period of lower ***consensus*** interest in hard assets generally and precious metals specifically. Yet, the gold price continues to set new all-time highs.

We believe the global investment regime of the next decade will prove starkly different from the past decade. Dominant trends of deglobalization, resource nationalism, renewable energy, social equity and government intervention are ***all*** inflationary. Therefore, in the new investment regime, we anticipate higher inflation, higher interest rates, lower stock & bond valuations and significant investor interest in commodities and hard assets. As shown in Figure 10, in our Addenda Graphs, the ratio of the S&P GSCI Commodity Index to the S&P 500 Index currently rests near half-century lows. From here, the risk/reward proposition of hard assets appears highly compelling.

Figure 8. Quarterly Spot Silver Price (Log Chart) (6/30/60-4/2/24)



Source: John Roque, 22V Research, Bloomberg

Finally, while technical analysis is not our forte, we have never been opposed to citing technicals when they support our case. In this regard, no commodity has carved out a more solid basing pattern than spot silver. Commenting in his 4/2/24 update (Figure 8, above), 22V Research's technical impresario, John Roque observes:

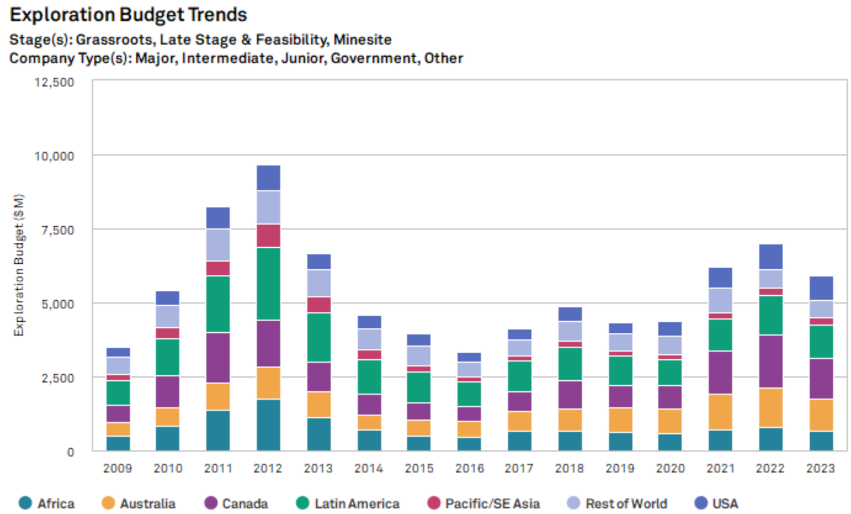
> This quarterly chart for ***silver*** offers some much-needed perspective and makes the long-term picture for the metal undeniably reliable…For five decades silver has ***always*** recorded higher lows and it has ***always*** been a ***BASE & breakout*** metal. I think this quarterly version is a Chart Watchers dream. Let's hope the metal is equally dreamy. First target is $30, then $40.

We'll certainly take it!

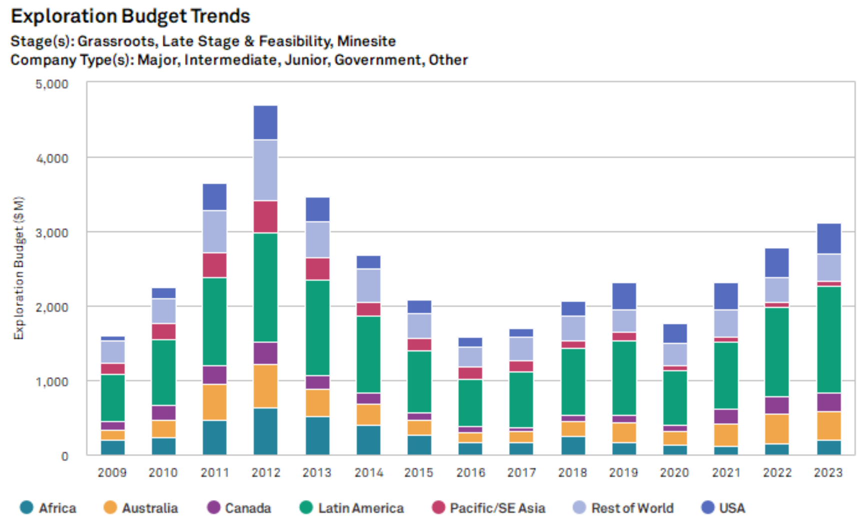
Authors: SCP Research and Trey Reik

Addenda Graphs

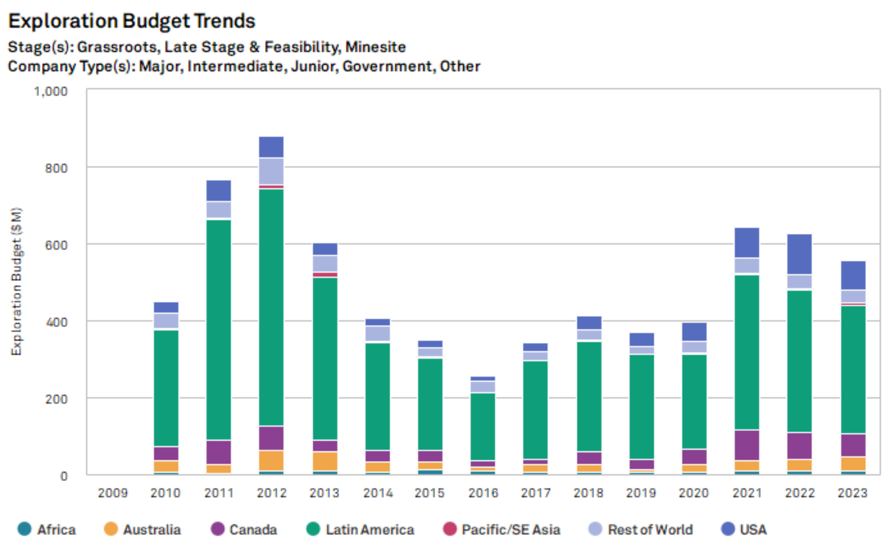
Figure 9. Global Exploration Budgets for Gold, Copper & Silver (2023)



Gold



Copper



Silver

Source: S&P Global IQ

Figure 10. Ratio S&P GSCI Commodity Index to S&P 500 Index (1/29/71-4/23/24)

Source: Bloomberg

APPENDIX 1: SILVER MINERS

Our regular SCP readers are likely familiar with our top silver picks. We like Aya Gold & Silver because like the combination of great geology and a great place to do business in Morocco, and a proven management team led by Benoit La Salle. GoGold has one of the top Mexican silver discoveries of recent years and we think is great value with the market now discounting Mexico on permits. Andean Precious combines a strong balance sheet with silver production in Bolivia and newly acquired gold production in the US. Silver Mountain is a near term restart candidate and value play, while Silver Tiger is putting out excellent grades in an attractive district in Mexico.

For the silver macro readers who are less familiar with our work, we've taken the time to profile four of the largest silver producers by EV – Coeur Mining, First Majestic, Hecla Mining, Pan American Silver. These are the largest and most liquid North American names and are often the first entry point for investors looking to play the silver thematic.

Below we comp the major silver producers, using Factset consensus financial forecasts, company guidance for 2024 (for production and AISC) and company reporting for resources and reserves. Although the sector trades at a premium to consensus NAV and U$68m per 1Mozpa AgEq production, the sector is in improving health with consensus 2024E EBITDA margins above 40% and consensus FCF yields increasing to 7% for 2024E. Given the macro tailwinds and operating inflection at a number of key miners: Coeur ramping up Rochester, Hecla restarting Lucky Friday and Keno, Pan American upscaled its assets via the Yamana acqusition, Aya ramping up Zgounder and First Majestic stabilized its portfolio leaving Jerritt Canyon as upside… We think now is a good time to play silver equities.

Figure 11. Comp table of major and mid-tier silver miners

Company	Ticker	Market	Mcap	EV	Trading Volume	AgEq Production 2023E	AgEq Production 2024E	AgEq AISC 2023E	AgEq AISC 2024E	AgEq TAC 2024E	P/NAV	EBITDA Margin 2023E	EBITDA Margin 2024E	EV/1Mozpa Ag 2023E	EV/1Mozpa Ag 2024E
			(US$m)		(US$m/d)	(Moz)	(Moz)	(US$/oz)	(US$/oz)	US$/oz	(x)	%	%		
Silver															
Pan American	PAAS	CN	6,694	6,363	24.2	99.1	105.6	16.0	17.2	21.1	1.1x	32%	43%	64	60
Fresnillo	FRES	LN	5,081	5,844	7.1	106.3	106.0	--	--	--	1.4x	33%	38%	550	551
Hecla	HL	US	2,985	3,457	40.0	26.2	41.5	18.2	14.2	20.2	1.2x	31%	43%	132	83
Coeur	CDE	US	1,959	2,370	30.6	36.1	39.4	16.4	19.7	24.5	1.1x	23%	32%	66	60
First Majestic	FR	CN	1,928	1,965	6.3	26.3	21.8	21.1	20.9	35.4	2.8x	19%	39%	75	90
Hochschild	HOC	LN	976	1,299	3.2	24.5	29.1	17.6	18.5	25.6	--	44%	46%	53	45
Aya	AYA	CN	1,221	1,220	4.1	2.1	5.0	15.0	12.0	30.0	1.2x	30%	50%	579	243
Mag Silver	MAG	CN	1,262	1,199	2.7	4.7	5.9	11.9	11.9	38.7	1.1x	61%	77%	254	202
Silvercrest	SIL	CN	1,209	1,119	2.1	4.9	9.6	13.1	16.1	30.5	1.8x	58%	64%	226	117
Endeavor	EDR	CN	643	494	1.0	8.5	8.3	24.5	23.5	28.0	0.9x	31%	54%	58	60
Average			**23,957**	**25,330**	**121.3**	**338.7**	**372.2**	**17.2**	**17.5**	**23.6**	**1.3x**	**33%**	**42%**	**75**	**68**

Source: Factset market data, company disclosure, compiled by SCPe. 2023E production and AISC as reported or YTD annualised.
2024E prodn and AISC are guidance averages. Financial metrics per factset. R&R metrics as reported by company

Company	Ticker	Market	Mcap	EV	EV/oz AuEq Reserve	EV/oz AuEq Resource	Life Reserves	Life Resources	FCF Yield 2023E	FCF Yield 2024E	EV/EBITDA 2023E	EV/EBITDA 2024E	Curr ND/EBITDA 2023E	Curr ND/EBITDA 2024E	EV/Revenue 2023E	EV/Revenue 2024E
			(US$m)		(US$/oz)	(US$/oz)	(years)	(years)	%	%	(x)	(x)	(x)	(x)	(x)	(x)
Silver																
Pan American	PAAS	CN	6,694	6,363	3.9	1.8	15.4	33.9	5%	9%	5.6x	4.0x	0.3x	0.2x	1.8x	1.7x
Fresnillo	FRES	LN	5,081	5,844	6.3	1.1	8.7	49.6	4%	6%	7.4x	6.5x	0.5x	0.5x	2.5x	2.4x
Hecla	HL	US	2,985	3,457	6.0	1.6	13.9	53.6	1%	4%	13.5x	9.8x	2.2x	1.6x	4.2x	4.3x
Coeur	CDE	US	1,959	2,370	4.8	1.8	12.6	33.5	-1%	8%	10.6x	6.4x	2.2x	1.4x	2.4x	2.1x
First Majestic	FR	CN	1,928	1,965	14.5	1.9	6.2	46.9	-1%	5%	15.2x	6.4x	0.5x	0.2x	2.9x	2.5x
Hochschild	HOC	LN	976	1,299	7.1	2.3	6.3	19.6	8%	17%	4.4x	4.1x	0.9x	0.8x	2.0x	1.9x
Aya	AYA	CN	1,221	1,220	18.0	2.9	13.5	84.7	-8%	3%	38.2x	10.0x	0.3x	0.1x	11.6x	5.0x
Mag Silver	MAG	CN	1,262	1,199	26.8	12.5	7.5	16.1	9%	10%	10.8x	8.8x	-0.6x	-0.5x	6.5x	6.8x
Silvercrest	SIL	CN	1,209	1,119	14.3	9.3	8.2	12.5	3%	5%	5.5x	5.3x	-0.5x	-0.5x	3.2x	3.4x
Endeavor	EDR	CN	643	494	4.5	0.6	13.3	103.4	-31%	20%	5.1x	2.0x	-0.3x	-0.1x	1.6x	1.1x
Average			**23,957**	**25,330**	**6.1**	**1.7**	**11.4**	**41.6**	**2%**	**7%**	**7.9x**	**5.8x**	**0.6x**	**0.4x**	**2.6x**	**2.4x**

Source: Factset market data, company disclosure, compiled by SCPe. 2023E production and AISC as reported or YTD annualised.
2024E prodn and AISC are guidance averages. Financial metrics per factset. R&R metrics as reported by company

Ticker: CDE NYSE **Net Debt:** US$518m **Project:** Rochester/Palmerejo/Wharf/Kensington
Market cap: US$1.9Bn **Price:** US$4.79 **Country:** US / Mexico

***Coeur Mining** is one of the largest US-based silver producers with current run-rate production in the range of 10.7-13.3Moz Ag and 310-355koz Au. We think Coeur is a good inflection point trade with silver prices and operations turning for the better. In recent years Coeur struggled with cost overruns at the Rochester expansion, efforts to mine at small scale at Silvertip post its US$500m acquisition, and with operating cost inflation. We see a turning point in 2024 as Rochester's expansion to 88ktpa repositions it as a long life, low-cost asset to complement Palmarejo and Wharf.*

Valuation, Coeur is currently trading at 1x NAV (per Factset consensus), US$4.1/oz AgEq EV/reserves and 5.6x 2024E Factset consensus EBITDA. Cash flow is expected to swing from negative over the past few years to materially positive by H2 2024, especially at spot precious metals prices.

Figure 12. Coeur asset locations and corporate overview

Source: Coeur Mining

Assets –Palmarejo the flagship, Wharf steady cashflow, Rochester at expansion

Palmarejo (Mexico) is the flagship asset. 2024 guidance is 5.9-6.7Moz Ag and 95-103koz Au (total ~14.5Moz AgEq at midpoint of guidance = ~36% of Coeur's 2024 group production) at US$16.5-17.5/oz Ag and US$1,075-1,275/oz Au cost applicable to sales (CAS). The mine is a decline accessed underground operation (sublevel stoping) with a ~7,000tpd flotation-Merrill Crowe plant producing dore. The mine has a reserve life of 7-years with 11.6Mt (metric) at 2.1g/t Au and 137g/t Ag for 770koz Au and 51Moz Ag.

Wharf (South Dakota) is an open pit, heap leach gold mine that has been Coeur's steady cash flow generator since its 2015 acquisition for US$99m. The asset has generated US$407m over nine years and increased reserves from 560koz to 764koz in that time, more than replacing depletion. Current reserves are 764koz at 0.96g/t Au and 2024 guidance is 86-96koz at US$1100-1200/oz.

Rochester (Nevada) is an open pit, heap leach Ag-Au operation with 2P reserves of 463.1Mt at 0.1g/t Au and 13g/t Ag for 1.24Moz Au and 193Moz Ag or ~58% of Coeur's total reserves calculated at spot prices. The guided mine life is 16-years based on reserves. The operation is ramping up to nameplate 88k tons/day in mid-2024 from previous 35k tons/day, annual production to 8.0Moz Ag and 80koz Au. 2024 guidance is 4.8-6.6Moz Ag and 37-50koz Au with H2 guided CAS of US$14-16/oz Ag and US$1200-1400/oz Au.

Figure 13. Coeur 2024 guidance and Q1 production

	1Q 2024	Full-Year Guidance[1]	Progress[2]	Full-Year Guidance Profile by Quarter[3]	Implied 2Q - 4Q 2024	Comments
Gold Production (oz)						
Palmarejo	33,160	95,000 - 103,000	33%	26%	61,840 - 69,840	• Higher average grades quarter-over-quarter • Increased average recoveries quarter-over-quarter
Rochester	5,755	37,000 - 50,000	13%	13%	31,245 - 44,245	• See comments under Silver Production for additional details
Kensington	21,434	92,000 - 106,000	22%	24%	70,566 - 84,566	• Lower production primarily due to mill down time impacting tons milled as well as lower average grade due to mine sequencing
Wharf	20,395	86,000 - 96,000	22%	21%	65,605 - 75,605	• Reflects timing of ounces placed on leach pads
Total Gold Production	**80,744**	**310,000 - 355,000**	**24%**	**22%**	**229,256 - 274,256**	
Silver Production (K oz)						
Palmarejo	1,818	5,900 - 6,700	29%	25%	4,082 - 4,882	• See comments under Gold Production for additional details
Rochester	699	4,800 - 6,600	12%	12%	4,101 - 5,901	• Lower planned production driven by new crusher commissioning and ramp-up, resulting in no new ore placed for ~90 days • Strong expected 2H post ramp-up
Wharf	67	NA	NA	NA	NA	• NA
Total Silver Production	**2,584**	**10,700 - 13,300**	**22%**	**19%**	**8,116 - 10,716**	

Production Outlook

	Gold (oz)	Silver (K oz)
Palmarejo	95,000 - 103,000	5,900 - 6,700
Rochester	37,000 - 50,000	4,800 - 6,600
Kensington	92,000 - 106,000	-
Wharf	86,000 - 96,000	-
Consolidated	**310,000 - 355,000**	**10,700 - 13,300**

CAS Outlook[2]

	Gold ($/oz)	Silver ($/oz)
Palmarejo (co-product)	$1,075 - $1,275	$16.50 - $17.50
2H 2024 Rochester (co-product)	$1,200 - $1,400	$14.00 - $16.00
Kensington	$1,525 - $1,725	-
Wharf (by-product)	$1,100 - $1,200	-

Capital, Exploration and G&A

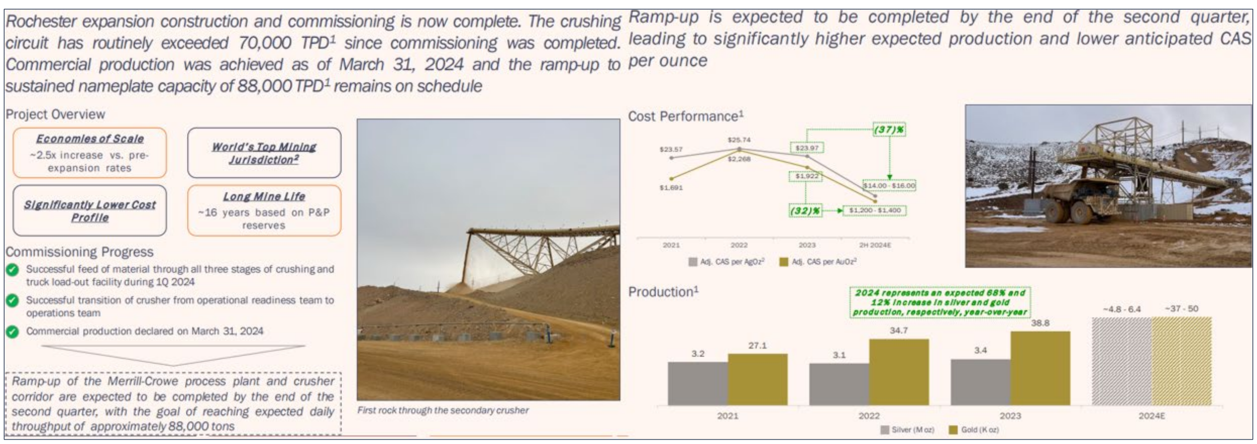
($M)	
Capital Expenditures, Sustaining[3]	$116 - $158
Capital Expenditures, Growth	$19 - $26
Exploration, Expensed[4]	$40 - $50
Exploration, Capitalized	$7 - $13
General & Administrative Expenses	$36 - $40

Source: Coeur Mining

Rochester Commissioning Update

The Rochester expansion has ramped up well with crushing reaching 70tpd and expected to reach 88ktpd in H2. With the pit scheduled to deliver higher grades in H2 2024, production hitting its first stage target of ~5.5Moz Ag and ~55koz Au, lifting to 8Moz Ag and 80kozpa (~170kozpa AuEq or 14.6Mozpa AgEq) over the first ten years of the current 16-year reserve life. At current prices at H2 cost guidance (a ~32-37% cost decrease from current levels), the asset should reach cash flow positive inflection. Multiplying steady state production by the peer average US$72m per 1Moz Ag/year trading multiple implies Rochester could trade at US$1.05bn once fully ramped up.

Figure 14. Rochester expansion update



Source: Coeur Mining

Other assets and financials

Coeur's fourth mine is Kensington (Alaska) an underground gold mine with a three-year mine life (411koz at 6.7g/t Au). 2024 guidance is 92-106koz at US$1,525-1,725/oz CAS. The mine has been investing in reserve growth since 2022. Silvertip (British Columbia) is Coeur's key development project. The project, located in BC's Golden Triangle, was acquired via the US$200m acquisition of JDS Silver. Coeur initially tried to put the project into operation using existing historic infrastructure but refocused on exploration, tripling the resource, which now totals 8.6Mt (metric) at 266g/t Ag, 10.5% Zn and 5.1% Pb 58Moz at 277g/t Ag of M&I resources. Financials: Coeur ended 1Q24 with US$67.5m of cash and equivalents and US$585.5m debt for US$518m of net debt or 3.2x LTM adjusted EBITDA with U$313m of total liquidity available. It has 49.95koz Au hedged at US$2,100/oz and 1.8Moz Ag hedged at US$26/oz.

Ticker: AG NYSE / FR TSX **Net debt:** US$0m **Projects:** San Dimas/Santa Elena / Jerritt Canyon
Market cap: $2.0 Bn **Price:** $6.90 **Country:** Mexico/US

First Majestic (FM) *is a mid-tier silver producer with three operating underground mines in Mexico and the Jerritt Canyon brownfield project in Nevada. 2024 guidance is 8.6-9.6Moz Ag and 150-167koz Au for ~22Moz AgEq at US$19.32-20.68/oz AgEq AISC with a 41% production weighting to silver at spot prices. FM sustained a heavy hit from its US$470m (in stock) acquisition of Jerritt Canyon in 2021, as it placed the mine on care and maintenance in mid-2023. However, FM maintains a healthy balance sheet and is now in a much better position to optimize its asset portfolio.*

Valuation wise, the Company trades at trades substantially at 2.9x consensus NAV (per Factset), 5% 2024E FCF yield, US$40/oz EV/reserve and US$93/oz annual Ag production. The upside comes from Jerritt Canyon's restart potential and reserve extensions at San Dimas and Santa Elena.

Figure 15. First Majestic asset locations

Source: First Majestic

Assets – three producing underground Ag-Au mines in Mexico with Jerritt Canyon on C&M

San Dimas (underground) continues to perform well and serve as FM's main cash generator, producing ~11.1-12.3Moz AgEq at US$15.5-16.6/oz AISC per 2024 guidance weighted 49/51% Ag/Au at spot. Mining is transitioning from the Jesica vein to new veins and exploration drilling is increasing this year to expand the current 5-6-year reserve life.

Santa Elena is guided to produce 7.8-8.7Moz AgEq at US$16.3-17.3/oz AgEq with production 14% weighted to silver at spot. The mine is wider and lower cost per tonne than San Dimas and recently installed LNG generators to reduce power costs. Mining is moving to the Central Ermitano area with grades of 2.5g/t Au and 85g/t Ag, shifting production towards gold. The asset has a 5-year reserve life with exploration potential along strike at Ermitano Luna.

La Encantada is FM's smallest asset at 2.2-2.4Moz at US$28.3-30.1/oz AISC guided in 2024. The mine was a 3.0-3.5Moz producer in the past but throughput was constrained due to water availability. An additional water source has been secured and throughput is guided to ramp up in 3Q24.

Other Assets and Financials

FM has several financial asset holdings in other silver companies as well as a silver stream from the Springpole project in Ontario. FM has US$125.6m of cash and US$125.6m of restricted cash with US$62m of marketable securities and US$50m drawn on it's US$175m revolving credit facility. It also has a US$199m convertible debenture. Factset consensus estimates put FM's ND/EBITDA at 0.2x 2024E, with a 6.6x 2024E EV/EBITDA multiple and 5% consensus FCF yield.

Figure 16. First Majestic 2024 guidance summary

	Silver Oz (M)	Gold Oz (k)	Silver Eqv Oz (M)	Cash Cost	AISC
Silver Operations:				($ per AgEq oz)	($ per AgEq oz)
San Dimas, Mexico	5.3 – 5.9	69 – 77	11.1 – 12.3	11.89 – 12.57	15.54 – 16.57
Santa Elena, Mexico	1.1 – 1.2	81 – 90	7.8 – 8.7	13.38 – 14.10	16.25 – 17.26
La Encantada, Mexico	2.2 – 2.4	–	2.2 – 2.4	24.03 – 24.51	28.25 – 30.09
Operations Total:	8.6 – 9.6	150 – 167	21.1 – 23.5	13.69 – 14.46	18.62– 19.90
Corporate:				($ per AgEq oz)	($ per AgEq oz)
General, Administration & Services	—	—	—	—	0.70 – 0.78
Total Production				($ per AgEq oz)	($ per AgEq oz)
Consolidated	**8.6 – 9.6**	**150 – 167**	**21.1 – 23.5**	**13.69 – 14.46**	**19.32 – 20.68**

- Certain amounts shown may not add exactly to the total amount due to rounding differences.
- Consolidated AISC includes general and administrative cost estimates and non-cash costs of $2.25 to $2.51 per AgEq ounce.
- Metal price & FX assumptions for calculating equivalents are silver: $24.00/oz, gold: $2,000.00/oz, 18:1 MXN:USD.

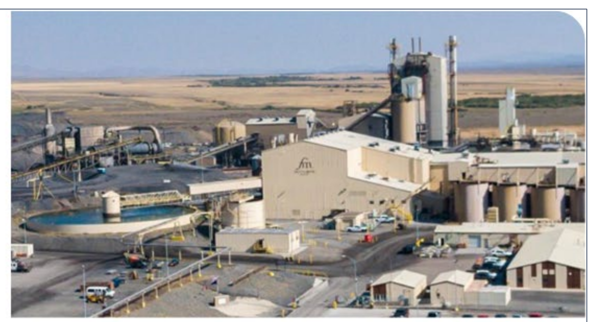
Source: First Majestic

Jerritt Canyon

While many may knock FM for its purchase of Jerritt (3.73Moz at 4.97g/t of which 49% of ounces in M&I), we believe that this mine will eventually prove its value. There are two related upsides – the first is the fertile exploration ground to the south which has never been systematically explored nor had a competent mine plan in place and the second is the unsurfaced value of the roaster in the middle of one of the most prolific sulphide and refractory gold districts globally. It would not surprise us to see FM come up with a revitalized plan to produce >200,000 oz Au annually, plus third-party processing, for a modest capex outlay. The key to the operation in our view is getting throughput up – the roaster has capacity for 4,500tpd and we think 3,000tpd is the right scale; this can be achieved through bulk mining or increasing the number of active faces to ensure tonnage. We expect to see more reserve additions and exploration results.

Figure 17. Jerritt Canyon overview

- Located in Elko County, Nevada, U.S.A.
- Underground mining operations temporarily suspended in March 2023
- Focused on new regional discoveries across the large 30,821-hectare (119 square mile) land package; ~$10M 2024 exploration budget
- Current known Measured & Indicated & Inferred resources of 3.73M Au oz
- Processing facility contains one of only three Roasters in the State of Nevada
- Analyzing the optimization of bulk mining and cost-effective mining methods
- Continuing modernization of the open-air processing plant to better withstand severe weather conditions



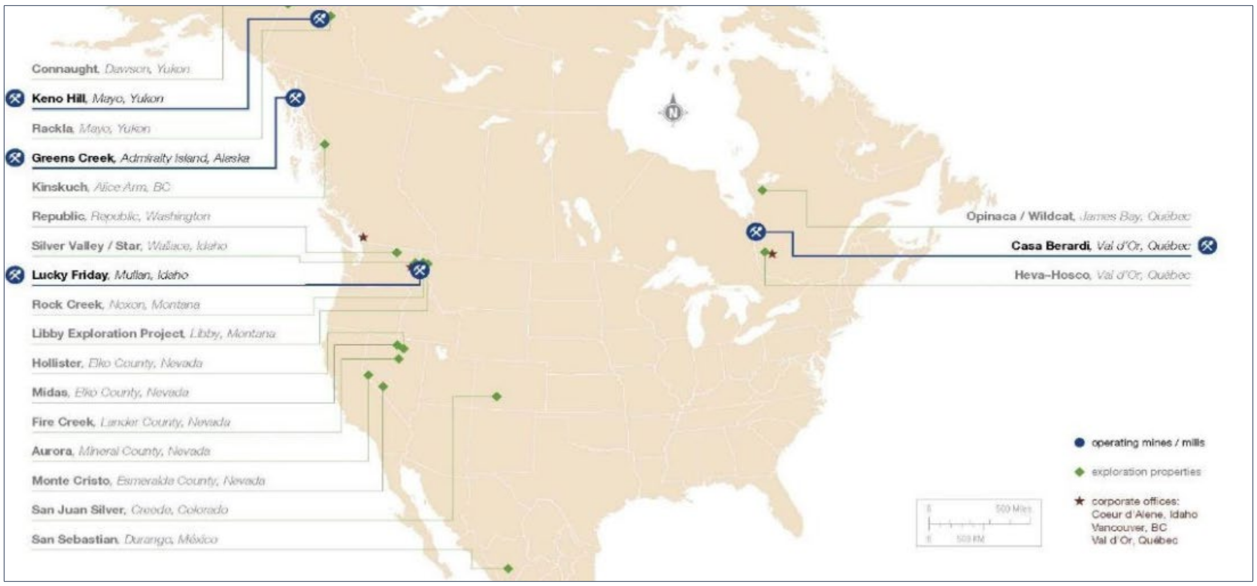
Source: First Majestic

Ticker: HL NYSE | **Net Debt:** US$557m | **Projects:** Greens Creek / Lucky Friday / Keno Hill
Market cap: US$3.0bn | **Price:** $4.77 | **Country:** US

***Hecla** is the largest US-based silver producer. 2024 guidance is 40-42Moz AgEq including 21-23Moz Ag and 122-133koz Au (~10Moz AgEq) putting silver weighting at ~55%. Helca's cornerstone asset is Green's Creek which generates over $100 MM of cash flow to Hecla per annum after development expense. Hecla has two substantial projects coming online this year, Lucky Friday and Keno Hill, are guided to produce a combined 12.5-13.5Moz AgEq this year as they ramp up. Hecla has a large and vibrant portfolio of exploration assets, and we believe is poised to consolidate independent assets as they become available.*

Valuation: Hecla trades at 1.1x Factset consensus NAV, US$5.9/oz AgEq EV/reserves and at $83/annual oz Ag of production based on the mid-point of 2024 guidance. Net debt is at 1.6x 2024E EBITDA (per Factset) and Hecla trades at 9.8x 2024E EBITDA and a 4% 2024E FCF yield.

Figure 18. Hecla Mining asset locations



Source: Hecla Mining

Asset overview: Green's Creek is the anchor, Lucky Friday and Keno Hill delivering growth

Green's Creek: Located on Admiralty Island on the Alaskan panhandle, Green's Creek is just over half of Hecla's AgEq production profile with 2024 guidance of 8.8-9.2Moz Ag, 46-51koz AuEq and 21-21.5Moz AgEq at byproduct AISC of US$9.50-10.25/oz. The mine is long-life with 105Moz Ag and 251koz Au of reserves at grades of 326g/t Ag and 2.8g/t Au for a 14-year reserve mine life. Green's Creek is an underground mine with production rates of ~2100-2300 short tons / day using cut and fill and LH stoping methods, with a conventional flotation circuit producing concentrates.

Lucky Friday (Idaho) is already hitting full stride after fire repairs, using the newly implemented underhand closed bench mining method. Mine development will stay heavy this year at $40-50m but should abate as the lower mine levels are successfully brought on. Exploration continues at depth and towards the mine's eastern perimeters and should expand the 19-year reserve life based on current reserves of 5.7Mt (metric units) at 427g/t Ag, 7.9% Pb and 3.7% Zn. 2024 guidance is 9.5-10.0Moz AgEq at AISC of US$10.00-12.25/oz including 5.0-5.3Moz of silver production. The mine is a ~1,000tpd underground mine and flotation circuit with concentrate sent to the smelter in Trail, BC.

Keno Hill (Yukon) is Hecla's newest asset after the 2022 acquisition of Alexco. With 55Moz Ag of reserves at 913g/t Ag, it is one of the richest silver vein systems in the world but needs capital to modernize mining methods and build out reserves. Exploration and development need to be actively followed up. Guidance is 3.0-3.5Moz AgEq for this year including 2.7-3.0Moz Ag. The mine has an 11-year mine life and per the most recent technical report, production is guided to average to 4.4Mozpa from 2024-2028.

Figure 19. Hecla Mining 2024 guidance

2024 Production Guidance	Silver Production (Moz)	Gold Production (Koz)	Silver Equivalent (Moz)[4]	Gold Equivalent (Koz)[4]
Greens Creek *	8.8 – 9.2	46.0 - 51.0	21.0 – 21.5	235 – 245
Lucky Friday *	5.0 – 5.3	N/A	9.5 – 10.0	115 – 115
Casa Berardi	N/A	75.0 – 82.0	6.5 – 7.2	75 – 82
Keno Hill *	2.7 – 3.0	N/A	3.0 – 3.5	36 – 40
Total	16.5 – 17.5	121.0 – 133.0	40.0 – 42.2	455 - 482

2024 Consolidated Cost Guidance	Cost of Sales (million)	Cash cost, after by-product credits, per silver/gold ounce[3]	AISC, after by-product credits, per produced silver/gold ounce[3]
Greens Creek	252	$3.50 - $4.00	$9.50 - $10.25
Lucky Friday	130	$2.50 - $3.25	$10.50 - $12.25
Total Silver	382	$3.00 - $3.75	$13.00 - $14.50
Casa Berardi	200	$1,500 - $1,700	$1,750 - $1,975

2024E Capital and Exploration Guidance (millions)	Total	Sustaining	Growth
Capital expenditures	$190 - $210	$122 - $132	$68 - $78
Greens Creek	$59 - $63	$56 - $58	$3 - $5
Lucky Friday	$45 - $50	$42 - $45	$3 - $5
Casa Berardi	$56 - $63	$14 - $17	$42 - $46
Keno Hill	$30 - $34	$10 - $12	$20 - $22
Exploration	$25		
Pre-development expenditures	$6.5		

Source: Hecla Mining

Other Assets and Financials

Helca also operates the Casa Berardi Gold mine in Canada, which is guided to produce 75-82koz Au at US$1750-1975/oz AISC. The mine is moving to open pit mining with guided cash flow generation until 2026 followed by an investment phase and then significant cash flow generation from 2031-2037.

Hecla's perhaps hidden asset is its large exploration portfolio. Hecla has large endowments in Montana and Rock Creek and a high-grade exploration program in Colorado and adjacent to Lucky Friday. Hecla is also an experienced acquiror and CEO Phil Baker has made no secret of his intentions to use their silver heritage and strong operating team to consolidate attractive production and exploration assets. Having already taken a stake in Dolly Varden, we think Hecla could acquire more assets in the Americas.

Hecla ended 2023 with US$106m of cash and US$663m of debt and leases or ~2.6x LTM and 1.6x 2024E (based on Factset consensus) EBITDA. Hecla expects to receive US$50m in insurance payments (related to Lucky Friday) through 2024.

Figure 20. Hecla Mining's 3-year production outlook

Consolidated Production Guidance	Silver Production (Moz)	Gold Production (Koz)	Silver Equivalent (Moz)	Gold Equivalent (Koz)
2024 Total	16.5 - 17.5	121.0 – 133.0	40.0 – 42.2	455 – 480
2025 Total	17.0 – 18.5	110.0 – 125.0	39.0 – 42.0	445 – 485
2026 Total	18.0 – 20.0	110.0 – 120.0	40.0 – 43.0	465 – 495

2024 Consolidated Cost Guidance*	Costs of Sales (million)	Cash cost, after by-product credits, per silver/gold ounce[3]	AISC, after by-product credits, per produced silver/gold ounce[4]
Total Silver	382	$3.00 - $3.75	$13.00 - $14.50
Total Gold	200	$1,500 - $1,700	$1,750 - $1,975

2024 Capital and Exploration Guidance (millions)	Total	Sustaining	Growth
Capital expenditures	$190 - $210	$122 - $132	$68 - $78
Exploration	$25		
Pre-development expenditures	$6.5		

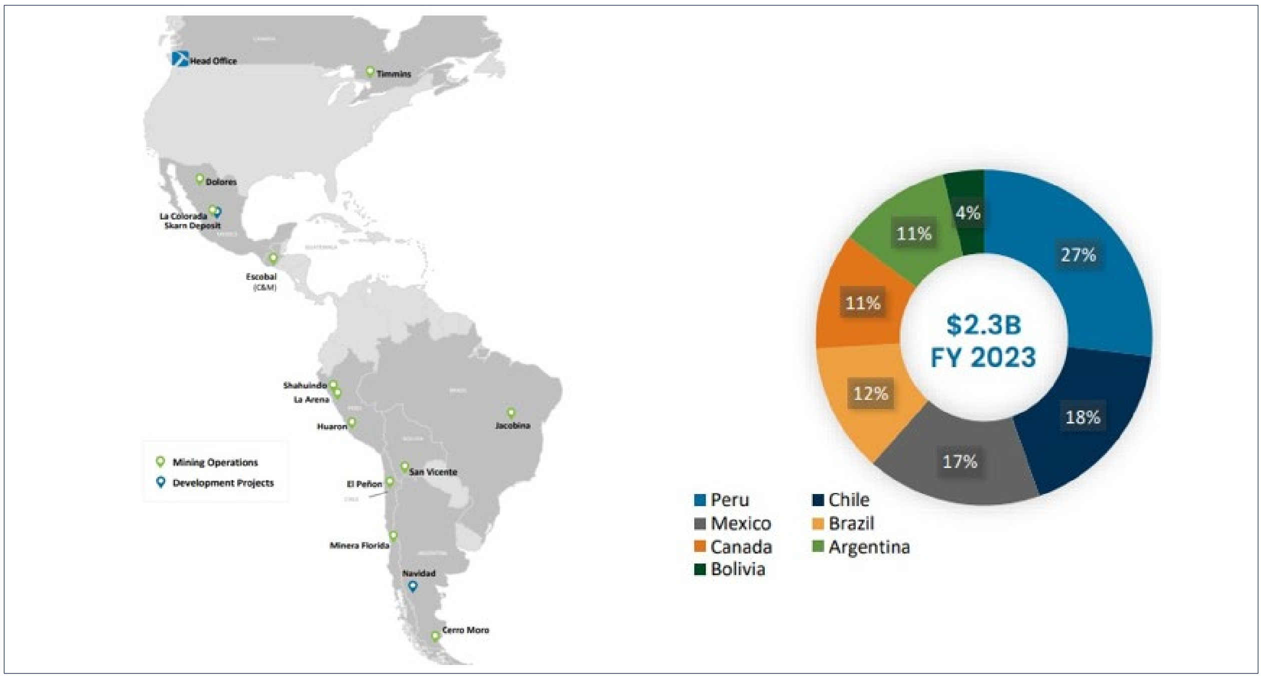
Source: Hecla Mining

Ticker: PAAS NYSE / PAAS TSX **Net debt:** US$361m **Projects:** 11 Operating; 3 Development
Market cap: $6.7Bn **Price:** $18.50 **Country:** Americas

Pan American Silver *is the largest silver miner by market cap. 2024 guidance of 21-23Moz Ag (AISC US$16.0-$18.5/oz) and 880-1,000koz Au (AISC US$1,475-$1,575/oz) for combined ~99Moz AgEq at a 22% silver weighting. The porfolio includes 11 mines in the Americas, with special expertise in Latin America (Peru, Chile, Argentina, Bolivia, Mexico and Brazil), P&P reserves of 487M Ag oz & 7.7M Au oz and M&I resources of 1.0Bn oz Ag oz & 16.1Moz Au and attractive development projects including Escobal in Guatemala, the La Colorada skarn project in Mexico and Navidad development project in Argentina. The company made the shrewd acquisition of Yamana's Latin American assets in 2023 – we estimate that the four acquired Yamana mines account for ~62% of AISC margin based on 2024 production and AISC guidance at spot prices.*

Valuation: Pan American trades at 1.1x Factset consensus NAV, US$4.0/oz AgEq EV/reserve, US$61m per 1Moz AgEq EV/production, 4.0x 2024E consensus EV/EBITDA, and a 2024E 9% FCF yield.

Figure 21. Pan American Asset Locations and revenue by country



Source: Pan American Silver

Assets –Diversified portfolio but Jacobina, El Penon and Cero Morro stand out

During 2023, Pan American completed the successful integration of Yamana's four South American precious-metal mines (Cerro Moro, El Penon, Jacobina and Minera Florida), while increasing cash flows at the operations. Based on 2024 production and AISC guidance and using spot prices to calculate AISC margin (production x spot price minus AISC guidance), Cerro Moro, El Penon and Jacobina account for ~57% of group AISC margin by our calculation. Cerro Moro (Argentina) is an ~1100tpd open pit and UG Au-Ag leaching operation with reserves of 1.2Mt at 276g/t Ag and 7.4g/t Au for 11.3Moz Ag and 302koz Au for ~3-year reserve life. Jacobina (Brazil) is arguably the flagship, with guided 185-203koz Au at US$1250-1350/oz production for 2024. The mine has a 16-year reserve life with 3.1Moz of reserves at 2.0g/t. It's a bulk 8,500tpd underground mine with a conventional CIL processing plant. El Penon is a 3,600tpd underground mine feeding a leach-Merrill Crowe plant with 26.5Moz Ag at 158g/t and 795koz Au at 4.4g/t. The current focus is on increasing reserve life to 8-10 years from the current 6 years.

Figure 22. Pan American 2024 Guidance

	Silver Production (million ounces)	Gold Production (thousand ounces)	Cash Costs ($ per ounce)(1)	AISC ($ per ounce)(1)
Silver Segment:				
La Colorada (Mexico)	5.3 – 5.7	2	16.60 - 19.30	21.00 - 24.00
Cerro Moro (Argentina)	3.2 – 3.5	93 – 115	3.20 - 6.70	8.00 - 11.50
Huaron (Peru)	3.5 – 3.8	–	9.30 - 11.20	15.25 - 17.25
San Vicente (Bolivia)(2)	2.9 – 3.1	–	15.30 - 16.60	17.30 - 18.30
Silver Segment Consolidated	**14.9 – 16.1**	**95 – 117**	**11.70 – 14.10**	**16.00 – 18.50**
Gold Segment:				
Jacobina (Brazil)	–	185 – 203	970 - 1,050	1,250 - 1,350
El Peñon (Chile)	3.6 – 3.9	120 – 135	950 - 1,030	1,200 - 1,300
Timmins (Canada)	–	125 – 135	1,530 - 1,630	1,830 - 1,950
Shahuindo (Peru)	0.2 – 0.3	122 – 144	970 - 1,050	1,550 - 1,650
La Arena (Peru)(3)	–	83 – 95	1,400 - 1,470	1,675 - 1,775
Minera Florida (Chile)	0.4 – 0.5	85 – 96	1,410 - 1,550	1,650 - 1,800
Dolores (Mexico)(3)	1.9 – 2.2	65 – 75	1,150 - 1,230	1,275 - 1,375
Gold Segment Consolidated	**6.1 – 6.9**	**785 – 883**	**1,165 – 1,260**	**1,475 – 1,575**
Total Consolidated Production	**21.0 – 23.0**	**880 – 1,000**		

Consolidated Base Metal Production

Zinc (kt)	42 – 46
Lead (kt)	19 – 22
Copper (kt)	4

Source: Pan American Silver

Portfolio optimization -adding more silver, trimming non core assets

Pan American have shown to be savvy M&A dealers – the Yamana transaction was transformational as we mentioned above. We think the next steps are to addess the silver-gold balance in the portfolio and we could see Pan American adding more silver production. On 1 May, PAAS announced the sale of the La Arena project for US$245m of cash upfront plus a US$50m continent payment to Zijin Mining, showing their commitment to portfolio rationalization. La Arena was short life with reserves to 2026, and the copper porphyry at depth wasn't PAAS's specialty.

Other assets and financials

We'll focus on the big growth options as Pan Am's portfolio is too large to break down every asset. The Silver portfolio has 46Mt of reserves at 291g/t Ag and 0.57g/t Au for 428Moz Ag and 639koz Au. The gold porfolio has 245Mt of reserves at 1.02g/t Au and 98g/t Ag for 7.7Moz Au and 487Moz Ag.

Escobal (Guatemala) is the standout with 264Moz Ag of reserves and a historical 20Moz/year run rate. Escobal has been on care & maintenance since 2017, pending completion of an ILO 169 consultation by the Guatemalan government with the Xinka indigenous peoples. We believe probabilities are rising that Escobal may successfully complete its ILO 169 consultation (and Supreme Court ratification) during 2025 -a restart could double Pan American's production.

La Colorada (Mexico) A December 2023 PEA for Pan American's skarn discovery below its operating La Colorada mine projected 17.2Mozpa Ag, 427ktpa Zn and 218ktpa Pb in the first 10 years of a 17-year mine life. The US$2.8bn capex estimate is the sticking point but the potential here is to find a base metals focused JV partner to carry the capex.

Navidad (Argentina) Pan American retains 100% of the Navidad project in Chibut, with 632 Moz at 127g/t of M& resources. The key hurdles are an exisiting provincial ban on open pit mining and national foreign exchange controls. We believe Navidad is a free option in the portfolio.

Financials: At year-end 2023, Pan American had US$441m of cash and investments and US$802m of total debt for US$361m net debt. This reduces to 116m pro forma from the recently announced sale of La Arena.

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Issuer	Symbol	1	2	3	4	5	6	7	8	9
Andean Precious Metals	APM:TSX	NO	NO	NO	NO	NO	NO	NO	NO	NO
Aya Gold & Silver	AYA:TSX	NO	NO	NO	YES	NO	NO	NO	YES	NO
Coeur Mining	CDE:NYSE	NO	NO	NO	YES	NO	NO	NO	NO	NO
First Majestic	FR:TSX	NO	YES	NO	NO	NO	NO	NO	NO	NO
GoGold	GGD:TSX	NO	NO	NO	NO	NO	NO	NO	YES	YES
Hecla Mining	HL:NYSE	NO	NO	NO	NO	NO	NO	NO	NO	NO
Pan American Silver	PAAS:TSX	NO	YES	NO	NO	NO	NO	NO	NO	NO
Silver Mountain Resources	AGMR:TSX	NO	YES	NO	YES	NO	NO	NO	YES	YES
Silver Tiger	SLVR:TSXV	NO	NO	NO	NO	NO	NO	NO	YES	YES

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SELL:	0
UNDER REVIEW:	0
TENDER:	3
NOT RATED:	0
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