



WORLD SILVER SURVEY 2016 A SUMMARY

Produced for The Silver Institute by the GFMS team at Thomson Reuters

Thomson Reuters

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ABOUT THE MAJOR SPONSORS OF WORLD SILVER SURVEY 2016

Coeur Mining, Inc.

Coeur Mining is the largest U.S.-based primary silver producer and a significant gold producer with five precious metals mines in the Americas employing approximately 2,000 people. Coeur produces from its wholly owned operations: the Palmarejo silvergold mine in Mexico, the Rochester silver-gold mine in Nevada, the Kensington gold mine in Alaska, the Wharf gold mine in South Dakota, and the San Bartolomé silver mine in Bolivia. The Company also has a non-operating interest in the Endeavor mine in Australia in addition to royalties on the El Gallo complex in Mexico, the Zaruma mine in Ecuador, and the Correnso mine in New Zealand. In addition, the Company has two silver-gold exploration projects - the La Preciosa project in Mexico and the Joaquin project in Argentina. The Company also conducts ongoing exploration activities in



Alaska, Argentina, Bolivia, Mexico, and Nevada. The Company owns strategic investment positions in several silver and gold development companies with projects in North and South America.

Fresnillo Plc

Fresnillo plc is the world's largest primary silver producer and Mexico's second largest gold producer, listed on the London and Mexican Stock Exchanges under the symbol FRES. Fresnillo plc has six operating mines, all of them in Mexico - Fresnillo, Saucito, Ciénega (including the San Ramón satellite mine), Herradura, Soledad-Dipolos¹ and Noche Buena; one development project, San Julián and four advanced

exploration prospects - Centauro Deep, Juanicipio, Orisyvo and Las Casas Rosario as well as a number of other long term exploration prospects. In total, Fresnillo plc has mining concessions covering approximately 2.1 million hectares in Mexico. Fresnillo plc has a strong and long tradition of mining, a proven track record of mine development, reserve replacement, and production costs in the lowest quartile of the cost curve. Fresnillo plc's goal is to maintain the Group's position as the world's largest primary silver company, producing 65 million ounces of silver and 750,000 ounces of gold by 2018.

¹ Operations at Soledad and Dipolos are currently suspended.

Industrias Peñoles, S.A.B. de C.V.

Peñoles is a mining group with integrated operations in smelting and refining non-ferrous metals, and producing chemicals. Peñoles is the world's top producer of refined silver, metallic bismuth and sodium sulfate, and the leading Latin American producer of refined gold and lead. The Company was founded in 1887 and it is part of "Grupo BAL", a privately held diversified group of independent Mexican companies. Peñoles' shares have traded on the Mexican Stock Exchange since 1968 under the ticker PE&OLES.

Peñoles highlights:

- Began operations in 1887 as a mining company.
- Has integrated operations in the areas of exploration, mining, metallurgy and chemicals.
- Listed on the Mexican Stock Exchange since 1968; the stock is included in the IPC index.
- One of the largest net exporters in Mexico's private sector.





Pan American Silver Corp.

Pan American Silver, a silver mining company founded in 1994, is currently the second-largest primary silver producer worldwide, with seven operating mines in Mexico, Peru, Bolivia and Argentina, as well as mineral deposits and projects in the



USA, Mexico, Peru and Argentina. Our mission is to be the world's pre-eminent silver producer, with a reputation for excellence in discovery, engineering, innovation and sustainable development. Our team of industry-leading professionals has proven experience in exploration, project development, operations, and finance. In 2015, we produced a record 26.12 million ounces of silver and 183,700 ounces of gold at cash costs* of \$9.70 per ounce of silver, and All-in Sustaining Costs per Ounce Sold ("AISCSOS")* of \$14.92. In 2016, we expect to produce 24.0 to 25.0 million ounces of silver and 175,000 to 185,000 ounces of gold at cash costs* of \$9.45 to \$10.45 per ounce of silver, and AISCSOS* of \$13.60 to \$14.90. In addition we plan to spend between \$65.0 and \$75.0 million in sustaining capital and between \$135.0 and \$140.0 million on expansion projects, mainly at La Colorada and Dolores.

Silver Wheaton Corp.

Silver Wheaton is the world's largest pure precious metals streaming company. The company offers investors cost certainty, leverage to increasing silver and gold prices, and a high-quality asset base. Its business model is based on paying low, predictable costs for

SILVER WHEATON

precious metals streams from a diverse portfolio of mines, with any increases in precious metal prices flowing directly to the bottom line. Silver Wheaton offers these benefits while at the same time seeks to reduce many of the downside risks faced by traditional mining companies. In particular, it offers its investors both capital and operating cost certainty. Other than the initial upfront payment, the company typically has no ongoing capital or exploration costs. Furthermore, operating costs have been historically fixed at around \$4 per ounce of silver produced and \$400 per ounce of gold produced, subject to inflationary adjustments.

World Silver Survey 2016 has been kindly supported by the following companies

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(major funding companies)

Asahi Refining Barrick Gold Corp. Cia. de Minas Buenaventura, S.A.A. Coeur Mining, Inc. Fresnillo Plc Hecla Mining Company Industrias Peñoles, S.A.B. de C.V. Pan American Silver Corp. Silver Wheaton Corp. The **World Silver Survey** has been published annually by The Silver Institute since 1990. Copies of the 2016 edition, as well as previous editions, can be obtained by contacting The Silver Institute at the address and telephone number on the front cover.

NOTES

UNITS USED:

supply and demand data are given in units of million troy ounces (Moz) rounded to one decimal place.
1 Moz = 31.103 t (metric tons)
1 ton = 32,151 troy ounces
1 ton = 1,000,000 grams (g)

TERMINOLOGY:

"-" = Not available or not applicable.
"0.0" = Zero or less than 0.05.
"dollar", "\$" = US dollar unless otherwise stated.

PRICES:

Unless otherwise stated, US dollar prices are for the London Silver Market fixing prior to August 15 2015 and LBMA Silver Price thereafter.

TABLE ROUNDING:

Throughout the tables and charts, totals may not add due to independent rounding

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This report is a summary of World Silver Survey 2016. The World Silver Survey (WSS) is an annual review of the international silver market. It contains the only truly global analysis of the world's silver markets and has been produced by the GFMS team at Thomson Reuters, the leading analysts of global precious metals markets, on behalf of the Silver Institute in Washington DC since 1994. The WSS is a unique source of silver supply and demand statistics for more than sixty countries. It contains a comprehensive analysis of investor activity, worldwide silver stocks and bullion flows as well as a lucid and concise account of the financial, economic and social factors underlying market trends. Details on how to order the full 100-page survey can be found on page six.

1. REVIEW AND OUTLOOK

In 2015, silver retail investment and jewelry fabrication hit a record high and mine production growth declined to its slowest pace in four years. The silver market realized an annual physical deficit for the third consecutive year in 2015. The market's deficit of 129.8 Moz (4,038 t) was more than 60% larger than the previous year's deficit of 78.6 Moz (2,445 t) and the third largest on record. Meanwhile, silver prices averaged \$15.68/oz, down 17.8% from 2014, the fourth consecutive annual drop.

Silver prices were dragged lower by investor expectations for an interest rate hike in the United States and a weakening Chinese economy. These two factors negatively impacted silver because of its dual nature as a financial asset and an industrial commodity. Money manager positions in COMEX silver futures and options fell into negative territory in the third quarter of last year amid relatively low prices and industrial fabrication demand for silver slipped by 4% mostly due to a 9% drop in China. The equity market decline in China also weighed on investor sentiment.

Investors took last year's price declines as an opportunity for bargain hunting in the physical market, however, accumulating 292.3 Moz (9,092 t) of coins and bars, a 24% surge from the previous year. This increase followed a 2% decline in 2014. The acceleration of physical purchases last year was triggered by silver's drop toward multi-year lows, which boosted coin buying, and a subsequent shortage of national mint coins globally. The shortage emerged first in North America, when the U.S. Mint halted sales of American Eagles for almost three weeks in July due to depleted inventory. Shortages and rationing quickly spread to the Royal Canadian Mint, the Perth Mint, the Austrian Mint, and others. Arguably, the systemic shortage across the silver coin minting industry was unprecedented.

WORLD SILVER SUPPLY AND DEMAND (MOZ)

(million ounces)	2014	2015
Supply		
Mine Production	868.3	886.7
Net Government Sales	-	-
Scrap	168.3	146.1
Net Hedging Supply	16.8	7.8
Total Supply	1,053.3	1,040.6
Demand		
Jewelry	224.0	226.5
Coins & Bars	236.1	292.3
Silverware	60.7	62.9
Industrial Fabrication	611.2	588.7
of which Electrical & Electronics	263.4	246.7
of which Brazing Alloys & Solders	66.1	61.1
of which Photography	48.5	46.7
of which Photovoltaic*	63.2	77.6
of which Ethylene Oxide	5.0	10.2
of which Other Industrial	165.1	146.4
Physical Demand	1,131.9	1,170.5
Physical Surplus/Deficit	-78.6	-129.8
ETP Inventory Build	1.5	-17.7
Exchange Inventory Build	-8.8	0.3
Net Balance	-71.3	-112.5
Silver Price, \$ per oz.	19.08	15.68
* Photovoltaic demand included in "Othe	r Industrial'' prior	to 2011
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In the first quarter of 2016, although safe haven demand was the primary driver, the relatively stronger market fundamentals acted as a spring board for silver prices, particularly given the continued elevated demand for coins and swelling concern about mine supply reduction in the future.

2. SILVER PRICES

 The LBMA silver price averaged \$15.68/oz in 2015, a 17.8% decline year-on-year and its lowest annual average level since 2009. Prices traded in the \$13.71/oz-\$18.23/oz range, beginning the year at \$15.97/oz and ending it at \$13.82/oz.

At the beginning of 2015, silver prices were being aided by gold strength, when gold rose above \$1,300/oz. Investors sought gold and other safe haven assets ahead of the expected stimulus by the European Central Bank (ECB). Silver rose as much as 14.2% in the first three weeks of the year as the euro fell to an 11-year low against the dollar and the Swiss central bank abandoned the franc's peg against the single-market currency. The renewed flaring up of the Greek debt crisis following the election of the SYRIZA party also fueled market concerns. Weaker than expected economic conditions in the United States during the first quarter certainly did not help either. These factors resulted in a resurgence of investor interest in gold and silver amid forecasts of weak global growth and fears that the ECB would not be able to revive the Eurozone economy. Silver prices closed January 23rd at \$18.23/oz, its highest in 2015. While silver softened when concerns over the Eurozone economy began to ease, silver prices still managed to remain above the \$16/oz level for most of the first half of 2015.

Silver prices began to trend lower in the latter half of June and this decline accelerated in the third quarter, when silver dropped 6.7% during the period and closed at \$14.65/oz at period-end. The managed money position on COMEX silver futures and options turned into a net short towards the end of June and remained so until the second week of August, the first time the position had been net short since the end of September 2014. Markets began to speculate about whether a rise in interest rates by the U.S. Federal Reserve (Fed) could be imminent, in conjunction with turmoil in emerging markets, causing weakness across various investment sectors. Further disappointing economic figures from China also cast a pall over commodities. However, the non-event that was September's Fed meeting, with the Fed also showing worries about the global economy and financial market volatility, did provide some price support for silver.

After the Fed's September meeting, silver prices rebounded somewhat in October, not only climbing back above the \$15/oz level, but also beyond the \$16/oz level on some days. Markets began to speculate as to whether the Fed would raise interest rates at all in 2015, given that the Fed, at that stage, seemed to have placed heavier weight on developments abroad on its monetary policy decision.

However, the hawkish FOMC statement in October caught the market by surprise, as the Fed removed warnings about global economic and financial developments that might hold back the U.S. economic recovery and put downward pressure on inflation in the near term. This sent signals to the market that a rate rise was possible during the last meeting of the year. Following the statement, the U.S. dollar strengthened and was trading at near three-month highs. Precious metals came under renewed selling pressure, with silver down 5% from the previous trading session's high. While the managed money position in gold turned net short in late November and remained so for the rest of 2015, the net position in silver remained long. The Fed announced a guarter-point increase in the target range for the federal funds rate during its last meeting of the year on December 16th; silver prices rebounded initially after the announcement, but further consolidation followed and it closed the year at \$13.82/oz.

Silver price volatility inched marginally higher, to 24.1%, in 2015, from 22% the previous year although volatility remained well below that seen in 2011, when the annual rate reached 61%. Monthly price volatility ranged from a high of 32.7% in January to a low of 13.1% in June.

THE SILVER PRICE AND THE U.S. DOLLAR



Source: Thomson Reuters Eikon

WORLD SILVER SURVEY: SUPPLY AND DEMAND METHODOLOGY

Physical surpluses and deficits in the silver market explain and sometimes, to an extent, influence price trends, lead times, margins and premia. These physical surpluses and deficits are not the only factor driving short term price movements, however, because unlike the purely industrial metals there is significant demand for silver as a financial asset. We estimate that in 2015, 25% of demand for new silver came from the physical coin and bar sector as investors increased private holdings. Coin and bar demand excludes investment in silver via exchange traded products. Many of these products are backed by physical silver held in bank vaults and depositories. Changes in these holdings are reflected in a separate data series in our supply-demand balance, but nonetheless also represent a source of physical investment.

In addition to physical investment, silver has an active Over-the-Counter (OTC) market, serving as a mechanism for risk and price management. OTC trade can have a meaningful impact on silver prices because of the market's depth. In 2015, the volume of silver transferred in the London bullion market, the largest OTC market for silver worldwide, totaled approximately 36.8 billion troy ounces (1.14 M t), with a value of \$575 billion, according to data published by London Bullion Market Association. Even this figure does not represent the total value of global silver transactions. As a rule of thumb, these net transfers, which exclude physical movements arranged by clearing members in locations outside London, are roughly one half of the total loco London market volume, which in turn makes up approximately 90% of global total turnover. In 2015, therefore, total volume was of the order of 81.7 billion ounces (2.54 M t) with a value of \$1.3 trillion; this is equivalent to over 90 times annual mine production.

The final element that differentiates silver from purely industrial metals is that it is commonly recycled or held as an above-ground asset by private and institutional investors, users, dealers, banks, and other entities. Shifts in these inventories, whether accumulations or sales into terminal markets, affect prices as well.

Thomson Reuters supply and demand data are collected and collated by a team of full time research analysts based in Australia, China, the United Kingdom, India and the United States within an extensive field research program that involves interviewing stakeholders across the supply chain. In order to build market statistics, the GFMS team at Thomson Reuters maintains individual demand databases for over 85 countries globally and for almost 600 mines and projects on the supply-side. As part of the primary research program, analysts collect information on jewelry and silverware fabrication, coin fabrication and sales, bar sales, industrial fabrication, refining volumes, shifts in above ground bullion stocks, and scrap sales. In addition to this, on a global basis, Thomson Reuters also collects information and data on net government sales and purchases and collates producer hedging and dehedging levels.



SILVER PHYSICAL SURPLUS / DEFICIT

Source: GFMS, Thomson Reuters

WORLD COIN AND BAR DEMAND



Source: GFMS, Thomson Reuters

3. SUPPLY

- Global mine production growth slowed to 2% last year, setting a record annual total of 886.7 Moz (27,579 t).
- Gains in mine supply were more than offset by weak scrap supply, falling by 13% year-on-year and representing a 22.2 Moz (691 t) decline.
- In 2015, the delta-adjusted hedge book grew by 7.8 Moz (244 t).
- Silver scrap supply dropped by 12.5% to 146.1 Moz (4,545 t), the lowest volume recorded since 1996.

Worldwide silver **mine production** increased for a 13th consecutive year to a record high of 886.7 Moz (27,579 t), although the rate of growth, at 2%, was less than half that of the previous three years. Notable country-level increases included Peru, Argentina, Russia and India. Providing an offset are examples of situations where price-driven curtailments are starting to impact silver supply, most materially so far in Canada, Australia and, to a lesser

SILVER OUTPUT BY SOURCE METAL

(million ounces)	2014 Output	% of Total	2015 Output	% of Total	Change y-o-y
Primary	253.0	29%	264.7	30%	5%
Gold	112.7	13%	118.8	13%	5%
Lead/Zinc	317.8	37%	305.8	34%	-4%
Copper	180.0	21%	192.5	22%	7%
Other	4.8	1%	4.8	1%	1%
Source: GFMS, Th	nomson Reu	ters			

WORLD SILVER MINE PRODUCTION



extent, in Bolivia. Chinese production, meanwhile, dipped by 3%, and it is likely that policy announcements made last year will drive further reductions in small scale production and enhance demand for imported silver-rich concentrate. However, there have also been incidences where lower commodity prices have driven downstream optimization in order to realize enhanced value from the production process. Examples from the lead/zinc industry include the sale of precious metals tied up in stockpiles at the Cerro de Pasco following the construction of a silver leach plant in Peru, and a program to sell accumulated pyrite concentrate at Bisha in Eritrea; these two initiatives alone added 3.5 Moz (109 t) of production last year.

Multi-year price lows led to **scrap** supply dropping by 13%. Behind the decline were fewer collectors active in the market and some processors held back material awaiting higher prices. As a result, scrap fell to its lowest since 1992, of 146.1 Moz (4,545 t). Indeed, if it was not for many emerging markets' currencies weakening appreciably supply would have been even lower.

The producer community added silver hedges last year, to leave the **hedge book** amounting to 38.9 Moz (1,213 t). GFMS calculates that delta hedging activities on behalf of the producers created 7.8 Moz (244 t) of accelerated silver supply over the year. The greatest contributions to this came from additional price risk management by Industrias Peñoles and Hochschild Mining.

SILVER MINE PRODUCTION - WHERE IT COMES FROM

Geographically, nearly half of mined silver comes from the Americas. Indeed six of the ten largest producing countries are in this region, including the two biggest, Mexico and Peru. Of greater market relevance is the type of mine that silver comes from – most silver emerges as a by-product of the mining of other metals. Most substantially, silver production comes from lead/zinc operations.

Only around 30% of output comes from so-called primary silver mines, where silver is the main source of revenue. This is noteworthy given that the impact of the price of silver is most acute on primary silver production, whereas by-product silver production is in large part a function of the price of the other metals, with which silver is mined.

4. DEMAND

- Total physical demand rose to a record high of 1,170.5 Moz (36,405 t) in 2015, up 3% from the previous year.
- The largest contributor to total demand growth was coin and bar investment, which surged 24% last year to reach a record high of 292.3 Moz (9,092 t), on the back of strong North American and Indian purchases.
- Jewelry fabrication increased for the third consecutive year and hit a fresh record high of 226.5 Moz (7,045 t). Strong growth in Indian and North American fabrication offset a near one third drop in Chinese fabrication.
- Industrial fabrication fell to 588.7 Moz (18,311 t), down 4% from the previous year. Declines in electronics, brazing alloys & solders, and photography were offset to an extent by record high solar and ethylene oxide catalyst demand.

Total **physical demand** saw a 3% increase in 2015, driven by higher retail investment, jewelry and silverware fabrication and solar and ethylene oxide catalyst demand. Growth from these sources was offset to a modest extent by weaker demand from the electronics, brazing alloys and solders, and photographic sectors. Bargain buying benefited coin and bar demand and jewelry and silverware demand, while industry-specific factors weighed on demand from the other sources.

Global **industrial offtake** totaled 588.7 Moz (18,311 t) in 2015, a 4% decline from the previous year, to post its lowest level since 2009. Increases in photovoltaic and



WORLD SILVER DEMAND

Source: GFMS, Thomson Reuters

SILVER ETP HOLDINGS





ethylene oxide (EO) demand were more than offset by lower demand for silver in electronics and electrical components, photographic papers, brazing alloys and solders and other miscellaneous applications. Global industrial production grew at its weakest annual rate since 2009, and the economic slowdown in the largest market, China, as well as ongoing thrifting ensured that global industrial usage fell. On a regional basis, weak fabrication demand in developing countries outweighed almost non-existent growth in developed countries.

Silver used in **photographic** applications continued to decline, falling by 4% in 2015, to 46.7 Moz (1,452 t), the lowest level in our series, which began in 1990. To put this into perspective, last year's level was down by 77% from the record high at the start of the millennium. That said, it is worth noting that the pace of decline slowed considerably, to its lowest rate since 2004, as the structural changes in the sector towards digital technology approach maturity.

Photovoltaic (PV) demand for silver totaled 77.6 Moz (2,415 t) in 2015, up a significant 23% from the previous year. This marks the second consecutive year of increases in this sector, driven by a recovery in growth from all three primary markets after years of excess capacity, while growth was particularly strong for Chinese solar panel installations.

Silver **jewelry** fabrication edged higher in 2015, rising 1% to a new record level of 226.5 Moz (7,045 t). The increase was built largely on the back of an impressive 16% annual rise from India as lower prices drove consumption and

industry inventory levels significantly higher. However, India's performance was largely curtailed by another sizable contraction in Chinese fabrication last year as the weaker economy dampened discretionary spending. Elsewhere, Thailand enjoyed a 16% jump in demand, boosted by a stronger export sector while North America also recorded a healthy 5% annual increase as lower sticker prices attracted consumers. Demand was broadly stable in Europe, while the Middle East retreated 7%. **Silverware** fabrication enjoyed the third annual rise in succession to an estimated 62.9 Moz (1,957 t), a ten-year high. Record offtake levels from India again provided the platform for the 4% rise in global demand, while further falls from China, due largely to the changes to the gifting culture, limited further industry expansion.

Identifiable Investment, which includes physical bar investment, coins & medals and ETP inventory build,

rose by 16% last year, to a seven-year high of 274.7 Moz (8,543 t). A close analysis of individual components of our identifiable investment figure reveals that last year's rise was primarily due to a jump in coin and bar investment, which recorded a 24% year-on-year increase to 292.3 Moz (9,092 t), the highest annual demand level in our records, overtaking the previous record high in 2013. Meanwhile, ETP investment recorded outflows, declining by 17.7 Moz (549 t) over the course of the year and finishing the year at 617.8 Moz (19,217 t).

Silver coin fabrication rebounded in 2015, rising by 24%, following an 8% decline in 2014, to bring total **coins and medals** fabrication to 134.1 Moz (4,172 t), the highest level n our records. Purchases were driven by silver price weakness in the second half of the year, with third quarter purchases recording a historical all time high.

SILVER'S FABRICATION USES

Industry: Silver is the best electrical and thermal conductor of all metals and so is used in many electrical applications, particularly in conductors, switches, contacts and fuses. Contacts provide junctions between two conductors that can be separated and through which current can flow, and account for the largest proportion of electrical demand. The most significant uses of silver in electronics are in the preparation of thick-film pastes, in multi-layer ceramic capacitors, in the manufacture of membrane switches, silvered film in electrically heated automobile windshields and in conductive adhesives. Silver used in the fabrication of photovoltaic cells is seen as an area of rapid growth in the short to medium term. Other industrial uses for silver include as a coating material for compact disks and digital video disks, mirrors, glass coatings and cellophane and batteries.

Jewelry and Silverware: Silver possesses working qualities similar to gold, enjoys greater reflectivity and can achieve the most brilliant polish of any metal. Consequently, the silversmith's objective has always been to enhance the play of light on silver's already bright surface. Pure silver (999 fineness) does not tarnish easily but to make it durable for jewelry, it is often alloyed with small quantities of copper. It is also widely used with base metals in gold alloys. Sterling silver, at a fineness of 925, has been the standard of silverware since the 14th century, particularly in the manufacture of "hollow-ware" and "flatware". Plated silverware usually has a coating of 20-30 microns, while jewelry plating is 3-5 microns.

Photography: The photographic process is based on the presence of light sensitive silver halide crystals, prepared by mixing a solution of soluble silver, usually silver nitrate, with a soluble alkali metal halide such as sodium chloride or potassium bromide. These grains are then suspended in the unexposed film. The effect of light on the silver halide disturbs the structure of this compound, rendering it selectively reducible to metallic silver by reducing agents called developers. The resulting negative image is converted to the positive by repeating the process under specific conditions. Photographic film is used in radiography, the graphic arts and in consumer photography. Photographic film manufacturers demand very high purity silver.

Coins: Historically, silver was more widely used in coinage than gold, being in greater supply and of less value, thus being practical for everyday payments. Most nations were on a silver standard until the late 19th century with silver coin forming the main circulating currency. But after the gold rushes, the silver standard increasingly gave way to gold. Silver was gradually phased out of regular coinage, although it is still used in some circulating coins and especially in American, Australian, Canadian, Mexican and Austrian bullion coins for investors.