

Alchemist



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Recreated Hoard Helmet © Birmingham Museums Trust

Welcome to Issue 117

By Dr Edel Tully

LBMA Director of Financial Services

As part of my new role at LBMA of Director of Financial Services, I have been leading work on developing the financial markets in which the precious metals ecosystem operates.

The creation of this position is illustrative of the importance that LBMA is placing on this development work. Nothing can happen in a vacuum; as we strive to advance standards and develop solutions, we need to work closely with crucial stakeholders such as central bank and prudential regulators to ensure a receptive environment for industry improvements.

It's just this type of pan-sector engagement that has been key in our campaign – in collaboration with the World Gold Council (WGC) – for gold to be reclassified as a Tier 1 High-Quality Liquid Asset (HQLA).

David Gornall and I issued a SUERF policy brief in which we assert that there is already a strong case for gold to be included in the HQLA list. Furthermore, recent market events have shown that many investors already utilise gold as a liquidity buffer as it has proven to be an asset that performs well during financial stress events (World Gold Council, 2025).

Our SUERF policy brief was released in response to a paper published by Professor Dirk Baur – commissioned by WGC – which examines whether gold qualifies as an HQLA according to the Basel Committee on Banking Supervision's criteria. Professor Baur's paper demonstrates that gold meets all market-based criteria and as many fundamental criteria as bonds for HQLA. His paper also looks at gold's liquidity, volatility, its performance as a flight-to-quality asset and its diversification properties.

David and I have also found that gold meets all market-based criteria for HQLA. Our paper shows that gold's daily and

high-frequency bid-ask spreads and volume-based liquidity measures are similar to that of the long-term (30-year) US government bond – demonstrating long-term liquidity – and that gold's liquidity is materially better in a crisis than the 30-year US government bond. Gold is, without doubt, an extremely High-Quality Liquid Asset.

I urge you to read the brief in full to explore our data and evidence. Please reach out if you'd like to find out more about the work we are doing in this sphere.

Indeed, the value of data extends beyond analysis and reporting – it also plays a transformative role in hands-on, creative fields.

Digital technology has been crucial for Ann-Marie Carey (Birmingham City University) and her team, as she expands on the fascinating presentation she gave at LBMA's Assaying and Refining Conference in this issue. Her article reveals even more about how digital technology assisted the craftspeople working on the restoration of the Staffordshire Hoard helmet, discovered in 2009.

Lauren Moise (Alpvision) reveals how counterfeiting is impacting the industry and how collaboration is essential to stay one step ahead of bad actors. Debajit Saha (LSEG) explores how silver demand in solar photovoltaics looks set to leapfrog in the next five years. And we find out more about how the work of LBMA Referees upholds the quality of the physical bars which underpin trust in the precious metals industry. I hope you enjoy this issue.



Gold: The Missing Piece in Bank Liquidity Buffers?

In the wake of the global financial crisis, regulators stepped in to shore up the banking system with tougher liquidity rules and ushered in the Basel Committee's Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) – two pillars designed to ensure banks can weather short-term and long-term funding shocks. At the heart of these rules is the concept of High-Quality Liquid Assets (HQLA), with the top-tier "Level 1" category dominated by cash and sovereign bonds.

This narrow reliance on central bank money and government debt leaves little room for diversification. Gold, historically a 'safe haven', seemed like a natural fit but it was omitted from the 2010 definitions due to limited market data and concerns over price volatility.

In 2018, the picture began to change. A robust set of gold over-the-counter (OTC) trading data finally became available. And now, a 2025 study by Baur et al. makes a compelling case: gold deserves a seat at the Level 1 HQLA table. Its inclusion could ease pressure in regions where sovereign bonds are in short supply or already stretched thin as monetary tools or collateral. As central banks and regulators face mounting challenges, we believe gold to be the liquidity buffer the world overlooked.

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Front Cover

Recreation of the Staffordshire Hoard Helmet. The project was a remarkable collaboration between archaeologists and craftspeople, combining digital technologies and traditional fine metalwork to bring a 7th century warrior king's helmet back to life. In collaboration with Birmingham Museums Trust and School of Jewellery, the project revealed not only the craftsmanship of the past but also the power of modern partnership in rediscovering lost history. Read the full article on page 10.

The *Alchemist* is published quarterly by LBMA. If you would like to contribute an article to the *Alchemist* or if you require further information please contact the Editor, Shelly Ford, LBMA, 7th Floor, 62 Threadneedle Street, London EC2R 8HP.

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Global Precious Metals Conference 2025

Kyoto, Japan

The Okura
26 - 28 October

Register



www.lbma.org.uk/events

Golden Spurs: from Dominance to Dormancy

By Simon Rostron
LBMA Consultant

Clearly then, some sets of spurs were for ostentation rather than use. In an age when the nobility fought on horseback, spurs were of importance and apparently served to distinguish the wearer even if his clothing or armour did not, given that knights wore golden (or gilded) spurs, squires wore silver spurs and pages wore tin spurs.

The Most Chivalric Black Prince

That said, even though spurs came into use among the Celts some 300 to 400 years before the Christian era, they weren't picked up by the Greek and Romans until much later, and even then there was distinction between those who

rode to the battlefield and then fought on foot ('dragoons', to use a later term) and the true cavalry. Also, the spurs of those days were simply pointed iron, whereas by the time that model of chivalry Edward the Black Prince took to galloping across the fields of France, spurs with 'rowels' characterised by a small, rotating disc or star at the end of the shank (used by riders to give finer leg commands and encourage a horse's movement) had become *de rigueur*, as the image on the right shows.

The Black Prince received his formal knighthood, and thus at least theoretically, his spurs, from his father, Edward III, in July 1346, at the beginning of an early campaign in the 100 Years War.



The British Royal gold spurs originally made for Charles II 1661 and altered for George IV in 1820. © Royal Collection Enterprises Limited 2025 | Royal Collection Trust



The Black Prince dressed as a Knight of the Garter. Note the golden spurs with star rowels.

The ceremony took place near the coast of Normandy and, subsequently, according to contemporary accounts, the Prince went burning and ravaging, which was described as a “right good beginning”. However, it was his heroics at the Battle of Crécy, where about a month later the English roundly defeated the much larger French force, that established a phrase still in use today.

Amidst the fighting, Edward found himself faced by a furious attack by the Count of Alençon, Charles the Magnanimous, which led to calls to his father, who was reportedly watching the conflict from a windmill, for reinforcements. Having discovered his son was uninjured, the king refused, saying he wanted to give his son the opportunity to “win his spurs” – the usual method of ennoblement on the battlefield. Edward survived but only barely, requiring the help of his standard bearer and the Earl of Arundel to do so. The victors, were, however, not magnanimous as far as the Count of Alençon was concerned.

The Battle of the Golden Spurs

While the Black Prince won his spurs at Crécy, there would have been many among the one thousand or more French nobles who lost theirs, given that spurs were a desirable battlefield prize. History, however, does not relate such stories from that day, entirely unlike the tales of the ‘Guldensporenslag’ or Battle of the Golden Spurs, which took place outside Kortrijk (Courtrai) in 1302.

This battle was also a French defeat, but this time at the hands of the Flemish, and “was a famous early example of an all-infantry army defeating an enemy force reliant on heavy cavalry. The 500 pairs of spurs that were captured from the French horsemen gave the battle its popular name.” (Wikipedia). In later years, and despite the fact that the French finally won the Franco-Flemish War, the battle came to be seen as a sort of Flemish coming-of-age event (and is today commemorated by a national holiday established in 1973).

Even before these two battles, golden spurs had become an integral part of royal regalia, certainly in England, when more than a century earlier, a pair of solid gold spurs were worn by Richard I (Richard the Lionheart) when crowned in Westminster Abbey in 1189. Subsequently, all English (and later British) kings and queens either wore a pair of spurs or had them ceremonially presented, as happened with Queen Elizabeth II at her coronation in June 1953, or held to the ankles as at King Charles III’s coronation in September 2022.



Sir Robert Vyner.

Robber Vyner’s Huge Contribution

Sadly, however, the spurs used on these auspicious occasions were not Richard’s originals (which probably saw a lot of wear during the Third Crusade). They first belonged to Charles II courtesy of the royal goldsmith, banker, Lord Mayor of London, the fabulously rich, Sir Robert Vyner (Viner) – the man who regularly lent money to defray the expenses of the state and found himself short by some £400,000 in 1672 when the Exchequer was unable to repay him. (Vyner was also one of the founders of the Royal African Company – see *Alchemist issue 101*.)

To put this amount of money into context, according to the Bank of England calculation, £100 in 1672 would be worth £19,600 today, meaning Sir Robert was down over £78 million. It might be some small consolation to know that the spurs he made for the 1662 coronation were, with some modification to the bindings, still in use 361 years later.

It is uncertain whether Robert Vyner, who was knighted in 1665, was either presented with golden spurs or, indeed, made a pair for himself. Certainly, there’s no record

of his appearance on a battlefield, although, born in 1631, he would have been just old enough to be involved in the later stages of the English Civil War.

The Papal Honour

That said, for one group of people who we might loosely describe as papal favourites, there has been another route to spurs – or at least one spur – open since 1367 when Charles IV, the Holy Roman Emperor, conferred the newly created title of the Order of the Golden Spur on a certain Fenzio di Albertino. This order, which is said to be the earliest papal chivalric institution, is, according to Wikipedia, “conferred upon those who have rendered distinguished service in propagating the Catholic faith, or who have contributed to the glory of the Church, either by feat of arms, by writings, or by other illustrious acts”.

The list of recipients of this honour is impressive and includes Raphael, Mozart, Casanova, Mussolini and, perhaps more surprisingly, King Hussein of Jordan and the Former Shah of Iran. Sadly, however, with the death in 2019 of the last remaining knight, Grand Duke Jean

of Luxembourg, the order is considered dormant.

And so, as things stand, we’ll have to wait for the coronation of King William V before the story of the golden spurs takes another step forward.



Badge of the Order of the Golden Spur.

The Battle of the Golden Spurs 1302.



Simon Rostron
LBMA Consultant

Simon has been Managing Director of Rostron Parry Ltd - media relations consultancy since 1991 and PR and media consultant to LBMA since 2014. In his earlier career he was a Stockjobber, London Stock Exchange and remains a legend in his own lunchtime.

State-of-the-art technology for sustainable production

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Emanuel Georgouras,
UK Chief Executive Officer.

Spotlight on Edgewater Markets LLC

Edgewater Markets joins
LBMA as a Full Member



5 QUESTIONS 5 ANSWERS

What were the reasons for you wanting to join LBMA and what do you see as the key benefits of membership?

Joining LBMA as a Full Member in 2024 was a natural progression for Edgewater Markets LLC. Since 2016, when Emanuel Georgouras (now our UK Chief Executive Officer) joined the firm as Managing Director and Head of EMEA, Edgewater has steadily built a strong presence in the precious metals market. This growth builds upon our core expertise in providing financial institutions with cutting-edge FX trading technology and deep liquidity pools. With the close support of our key metals counterparties and bullion bank partners, we have developed robust client flows in the sector. The timing was right to formalise our position in the industry through LBMA Membership, which enhances our credibility and underscores our commitment to the highest standards of integrity, security, and best practices in the global precious metals marketplace.

Tell us about your company's role in the precious metals market?

Edgewater occupies a unique position within the precious metals market. Unlike a traditional retail broker or a pure electronic foreign exchange (EFX) provider, Edgewater operates at the intersection of a full-service FX brokerage and a bespoke trading technology firm, acting as both a liquidity consumer and provider. The firm delivers liquidity across all four precious metals, as well as in FX and non-deliverable forwards (NDFs), offering clients a comprehensive and integrated trading solution.

What's the background and history of the company?

Edgewater was originally established as a spot FX business, spun out of a US-owned and backed futures brokerage. In recent years, the firm has evolved to include an FCA-regulated UK entity in its group, broadening its credit offering beyond traditional prime brokerage clients to now include institutional margin collateral clients. Today, Edgewater holds a leading position in the provision of spot precious metals and FX liquidity to the institutional electronic marketplace.

What factors do you expect to impact your business in the short to long term?

The ongoing impact of US tariffs under the Trump administration remains a key consideration across metals, equities, and the broader financial markets. The resulting liquidity constraint combined with sustained all-time highs have significantly accelerated Edgewater's trading volumes, particularly in gold. However, as with most market disruptions, a period of normalisation is expected. The focus now shifts to anticipating the downstream effects of these market shockwaves as we move into the third quarter of 2025. Over the long term, we anticipate that metals prices will remain elevated as the USD weakens, albeit with a more moderate trajectory.

What are your future plans for the business?

Edgewater's plan in the precious metals market is to organically grow into a Loco London physical offering at some point in the near future.



Recreating the Staffordshire Hoard Helmet: A Collaboration of Digital and Fine Metals Skills

By Dr Ann-Marie Carey

Associate Professor, School of Jewellery at Birmingham City University

On 5 July 2009, Terry Herbert was looking forward to a perfect summer's day and a few quiet hours of metal detecting. Hebert had previously asked for – and been granted – permission by Fred Johnson, the landowner, to explore the field. Located on a hill next to the busy A5 road, it was a location he had driven past many times before. Initial detector readings revealed an 18th century penny, then later in the day a potential brass fitting.

So far, nothing unusual. Until he looked closer and saw what looked like gold. Within a few moments, several more readings registered. Emerging from the topsoil and glinting in the sunshine were numerous unusually shaped gold objects. To Herbert's astonishment, he had discovered an unknown hoard of Anglo-Saxon gold and silver in a farmer's field in Staffordshire.

Herbert duly reported the find, a legal requirement in England, to the Portable Antiquities Scheme. An archaeological investigation was promptly organised, with the increased activity on the farmer’s field clearly visible from the A5. The hoard was vulnerable. To guard against theft, passersby and journalists were told that “no Roman pottery has been found yet” – a partial truth to protect the hoard.

Once the hoard objects had been recovered from the field, the find was legally listed as ‘treasure’ and valued at £3.285 million. The hoard became headline news and was quickly named ‘The Staffordshire Hoard’. Funding commenced to compensate Herbert and Johnson, and in September 2009, Birmingham Museums Trust (BMT) and The Potteries Museum (TPM) jointly acquired the Hoard. The location of the Hoard beside the A5 was, in the 7th century (archaeologists’ date of its burial), the Roman road of Watling Street.

The area was border territory, a meeting point of Anglo-Saxon and British cultures at a time of religious transition between Pagan and Christian beliefs, and the area became part of the Kingdom of Mercia. The Hoard remains the largest collection of Anglo-Saxon gold (4kg) and silver (1.7kg) ever discovered.

The Staffordshire Hoard contains more than 4,000 artefacts. The items it contains – including military fittings for swords, two Christian crosses and saddle furnishings – were quickly recognised and catalogued. However, there remained 2,600 unidentified broken and twisted fragments, multiple thin sheets forcefully torn apart, strips of gold, hundreds of rivets and larger curved structures that might suggest the rim of a pot or possibly a vessel, a ceremonial drinking cup or even a crown. It was difficult to envisage what the fragments represented or their purpose.

Revealing Secrets

Over several months, Chris Fern and George Speake – both Anglo-Saxon iconographic specialists – reviewed each fragment, interpreting the embossed patterns to piece together incomplete jigsaw panels of gold. The Hoard began to slowly give up its secrets and reveal narrative images of priests, marching and kneeling warriors, cavalry figures and zoomorphic (animal-like forms that cannot be identified) designs. The archaeologists were cautiously confident in the evidence: a panel with military and religious designs, and a quantity of precious metal which hinted at a single large item of prestige and purpose. These elements indicated an exceptionally rare 7th century Anglo-Saxon Warrior King’s Helmet – an incredible discovery.

For both museums, this was an amazing development, but also a conundrum for conservation, accessibility and engagement. The fragments were fragile and, in line with conservation protocols, had to remain in their found condition. Their damage was integral to the Hoard’s story. Although the fragments presented a glimpse of what the helmet might have been, it was difficult to fully convey the significance and impact of the helmet through the fragments alone. For the museums, the issue became how best to materialise the helmet, whilst at the same time protecting the Hoard’s fragments.

The Power of Partnerships

Birmingham Museums Trust and The Potteries Museum reached out to the School of Jewellery in Birmingham’s Jewellery Quarter. The institutions had previously collaborated on two heritage projects, an exhibition about Matthew Boulton (inventor, engineer and silversmith, 1728-1809) in 2009, and on a recreation of the Staffordshire Hoard’s Christian Cross, which was presented to Pope Benedict in 2010 from the people of Birmingham.

A reconstruction of the Hoard Helmet would address many of the museums’ concerns. The opportunity to reconstruct the helmet and create a life-sized wearable interpretation, informed by the original helmet fragments, captured the whole team’s imagination. It was the largest and most complex recreation the school had undertaken.

Traditional Meets Digital

The school has a reputation for combining traditional fine metalwork and digital craft skills with material understanding – and for bespoke approaches to unique commissions. The museums’ brief was to translate the archaeologists’ research findings into a tangible and readable single object, capturing a moment in time when the helmet first left the smith’s workshop, in pristine condition. Recreating the complex three-dimensional metal jigsaw puzzle of the helmet required a collaborative team of specialist crafts people and specific skills: jewellers, silversmiths, die sinkers, stampers, engravers, platers, laser scanners, computer aided design (CAD), computer numerical controlled (CNC) and three dimensional print experts, and polishers. All were willing to share and apply their knowledge to materialise the helmet.

This article will discuss the reconstruction process for two significant components: the narrative panels and the cheek pieces. These were the most complex and challenging components and their analysis provided an insight into the journey of the contemporary crafts people, as the team brought the helmet to life.

Using the fragments as reference points, as well as the archaeologists’ findings, work began to capture the components and craftsmanship features on the narrative panels and cheek pieces. The narrative panels were produced using six different processes, each of which required workshop trials, adjustments and a degree of head scratching!

The processes and stages included laser scanning. This provided information on the thickness of the metal shim (0.1mm), the depth of the embossing and the overall size of the fragment, as well as reference points for the CAD files. The files created virtual stamping dies and data to plot the CNC for machining the high-density modelling board, for the male and female stamping dies. The dies were finished with hand engraving to ease (remove material) the vertical walls of the dies with a fine tolerance to allow the stamping dies to emboss but not cut the metal – a process whereby “it is not what you remove that’s important but what you leave behind”.

Budget constraints meant high-carat gold shim was substituted with copper shim, which is not as malleable as gold. This meant several annealing and restamping stages were required to reach the desired depth and detail. The panels received a gold-plated finish and a final polish.

Forward March

One interesting observation on the crested warrior panels is the direction of their march. The row of panels on the helmet are positioned around the circumference above the brow, thus the warriors could be seen as marching round and round the head!

However, there are two sets of warrior panels, one with warriors marching to their right and another with warriors marching to their left. The warriors start marching from the back of the head in opposite directions and meet at the forehead as they march forward into battle, suggesting a strong intent and conviction towards the original craftsmen’s iconography and beliefs.

The cheek pieces were the least damaged items. Laser scans captured the detailed carved surface and provided the basis of the CAD files.

Broken tabs and wire work were virtually augmented to create stereolithography files for 3D printing as a sacrificial pattern for casting in bronze. The actual cheek pieces were gold with lines of silver detail. To emulate the bi-metal finish, the bronze casting was entirely silver-plated, then sections of the silver plate were masked off with nail varnish and plated in gold. When the nail varnish was removed, the bi-metal finish was revealed.



Images:
1. Helmet fabrication trials © School of jewellery
2. Cheek 3D print © School of Jewellery
3. BMT basement Staff Hoard Fragments: © Birmingham Museums Trust

Reconstruction and Fabrication of Iron and Leather Components

The Hoard is a collection of precious metal fragments – there is no evidence of the iron or leather substructures of the helmet cap. This led one of the experts to comment that the work was like “trying to build a house when only the wallpaper survives”.

The project team reached out to blacksmiths and leather workers to create the foundations of an iron and leather cap upon which the components could be attached. The placement of the panels was informed by the archaeologists’ findings, with panels set in rows around the cap with a hierarchy of iconography representing Anglo-Saxon warrior society.

The uppermost panels represent priests and cavalry. The next layer reveals bird-crested marching warriors, followed by zoomorphic quadpods and then kneeling warriors. Each panel is held in place by a reeded (carved lines in the surface) strip, with rivets passed through the leather. The aforementioned curved structure that suggested the rim of a vessel became the fixture for a crest of horsehair dye in madder root (organic red dye), aligned from the forehead to the back of the head.



4. Stamping Dies: © School of Jewellery
5. Cheek Detail © Society of Antiquaries of London

A New Appreciation

The recreation of the helmet has prompted a reassessment of the 7th century technologies in terms of the level of craft skills, the metallurgical understanding of precious metals, the innovation in tools, the trading routes and even the belief systems of the time. In undertaking the reconstruction and experiencing first-hand the types of craft processes involved in making the original helmet, both the archaeologists and crafts people have a new appreciation of 7th century smiths; namely to not underestimate their achievements considering the tools and knowledge they had.

The legal ownership of the Hoard is shared between Birmingham Museums Trust and The Potteries Museum. There is only one Hoard, but due to the reconstruction project, there are now two helmets, one for each museum, which were simultaneously revealed on 3 November 2018. Mark Routledge (known as Gally Bagger) is the leather worker who created the internal leather cap and re-enactor, an appropriate model as he sits comfortably wearing the helmet with the knowledge his master craftsmanship along with the skills of other crafts people are now part of the helmet's story. This image has become the iconic image of the Staffordshire Hoard.

Project Acknowledgement:

The Helmet replica project was funded by Birmingham Museums Trust and The Potteries Museum and Art Gallery, Stoke-on-Trent, and is based on a major research project funded by Historic England and the museums. The full results of the research project are published by the Society of Antiquaries and the Archaeology Data Service.

The helmet replica project team includes Birmingham Museums Trust, The Potteries Museum and Art Gallery, Birmingham City University School of Jewellery, Drakon Heritage and Conservation, Gallybagger, Royal Oak Armoury and jeweller Samantha Chilton. George Speake and Chris Fern, specialists on the main research project.

Visit the website [here](#).



Dr Ann-Marie Carey

Associate Professor in the School of Jewellery, Birmingham City University

The duality of craftsmanship and technology is a constant thread in Ann-Marie's research and brings a subject-specific perspective to the examination and interpretation of artefacts and their production.

The combination of craft, technical and academic expertise has been particularly appropriate in the heritage sector. Ann-Marie has worked with Birmingham Museums Trust and the Museum of London (MoL) utilising her craftsmanship expertise to deconstruct and recreate heritage artefacts which led to a significant contribution to 'The Cheapside Hoard: London's Lost Jewels' exhibition (2013-14): the most successful exhibition in Museum of London's history. Ann-Marie's current research project – Small Performances – investigates the typographic punches of John Baskerville (1707-75) through heritage science and practice-based research, an interdisciplinary project funded by the Arts & Humanities Research Council in collaboration with Cambridge University.

Mark Routledge modelling Helmet:
© Birmingham Museums Trust.



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The Silent Risk Counterfeiting in Precious Metals

By Lauren Moïse

US Head of Sales, Marketing, and Operations, AlpVision

In a business where value is measured in grams and trust underpins every transaction, security remains a key concern. Yet one threat is often underestimated: the increasing sophistication of counterfeit metal products.

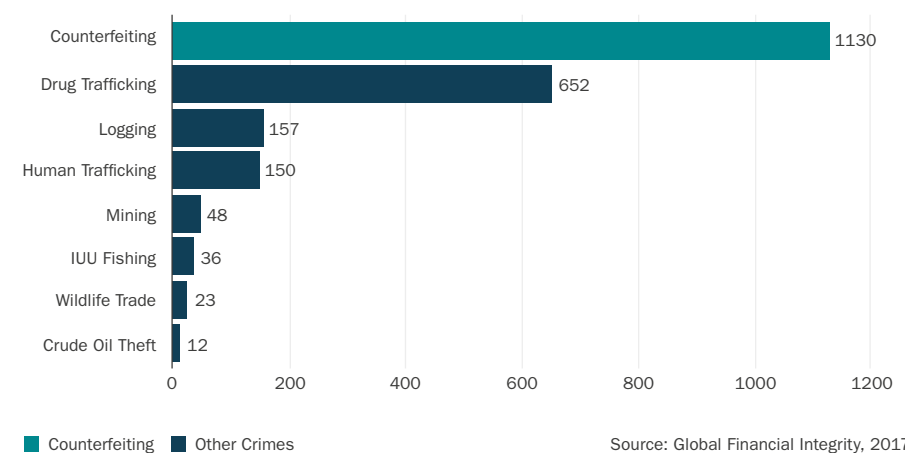
The issue extends beyond low-quality imitations sold in tourist markets. It's a trillion-dollar global criminal enterprise capable of producing highly convincing fakes that can deceive even seasoned professionals.

Counterfeit metals distort markets, undermine trust, and have been linked to organised crime and illicit financing. Despite the risk, public discussion remains limited, often due to concerns about consumer and investor confidence.

Understanding the Scope of the Counterfeit Economy

Counterfeiting is now the world's most lucrative form of illicit trade, with estimated annual revenues nearing \$1 trillion. It outpaces all other major illegal activities, including drug trafficking, human trafficking, and illegal mining. Corsearch estimates that counterfeit goods accounted for approximately 3.3% of global trade in 2023 and will reach 5% by 2030. In practical terms, one out of every twenty consumer dollars will be spent on fake products.

Est. Annual Revenues (in Billions) from Major Transnational Crimes



The data underscores the scale of the issue. Counterfeiting generates more illicit revenue than any other black-market activity, posing both a direct financial threat and a systemic risk to legitimate supply chains.

Est. Growth in Counterfeit Goods as Share of Global Trade

3.3%
in 2023

5.0%
in 2030

Source: Corsearch

Recent Trends in Precious Metal Counterfeiting

While global counterfeiting statistics are alarming, they don't fully reflect the specific risks facing the precious metals industry. In 2019, more than 1,000 counterfeit gold bars, worth over \$50 million, were discovered in vaults around the world.

These bars were sophisticated fakes. They carried forged refinery stamps, matched expected assay and weight specifications, and some tested at 99.98 percent purity. Their high quality allowed them to move through the global supply chain undetected. Although that particular batch was eventually identified and removed, it likely represents only a small portion of what remains in circulation.

While no single case has matched that magnitude since 2019, online activity has steadily increased. Driven by economic uncertainty, consumers are turning to tangible assets, leading to a surge in gold and silver coin sales at retailers such as Costco.

This increased demand has also attracted a rise in scams. Counterfeiters operate across platforms such as eBay and Facebook, often claiming authenticity certification through reputable counterparties. Some victims have lost tens or even hundreds of thousands of dollars, often with limited options for recovery.

The issue also extends beyond bullion, as any product with high value or strong market demand is a potential target. Counterfeit precious metals appear in end-use products, such as medical devices and jewellery.

Between 2018 and 2020, European regulators found dental implants falsely labelled as gold- or platinum-based alloys. Many were low-grade nickel products, linked to allergic reactions and device failures. These items moved through informal networks with little oversight.

Early this year, authorities in Hawaii arrested a man selling counterfeit gold jewellery in public areas, claiming the items were antique or rare.

One month later, US Customs intercepted a shipment of counterfeit designer jewellery in Puerto Rico. Originating from China, the shipment had an estimated retail value of \$3.5 million.

Many cases only come to light when fraud is uncovered or suspects are arrested. As a result of this under-reporting, consumers and investors often lack the information needed to make informed decisions. Even established resale platforms, such as TheRealReal and Farfetch, have faced criticism for unknowingly selling counterfeit items, putting high-end watches and precious metal jewellery at continued risk.



Industry Devaluation Through Market Impact

The consequences of counterfeiting extend far beyond individual losses. At the market level, it introduces artificial supply, distorts pricing, and undermines investor confidence.

News of counterfeit bullion in circulation can trigger panic selling, while undetected fakes suppress prices over time by inflating perceived inventory. As confidence declines, so does liquidity, particularly in premium or collectible segments.

The damage is also structural. Genuine products lose value as buyers hesitate to pay a premium without certainty of authenticity. This devaluation affects refiners, dealers, and investors, while raising the cost of compliance and due diligence across the board.

Operationally, even legitimate businesses face increased scrutiny and delays. Trust within supply chains weakens, and verification burdens grow. Meanwhile, counterfeiters increasingly target not just products, but the intellectual property behind them, replicating designs, technologies, and proprietary processes.

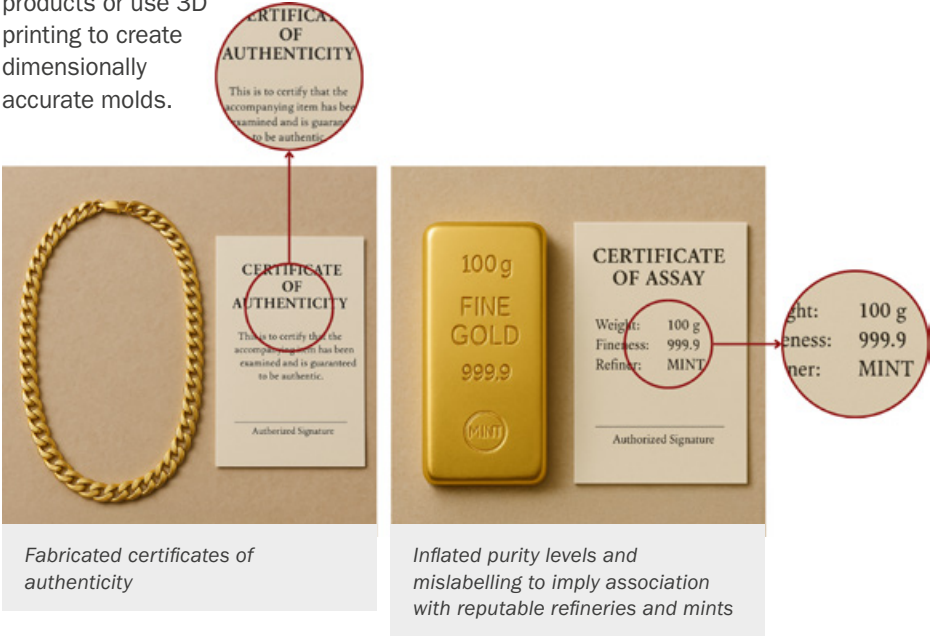
Many counterfeit operations are tied to illegal mining, environmental degradation, and transnational crime. Proceeds often fund activities such as drug trafficking and money laundering, turning what may seem like a commercial threat into a broader ethical and security concern.

The Mechanics of Counterfeit Bars and Coins

Understanding how counterfeiters operate is essential to identifying suspect products in the supply chain. Their methods have evolved well beyond crude imitations, with increasingly advanced manipulation of both material composition and physical characteristics.

Some of the most common tactics are base metal plating and alloy manipulation, using other metals with dense cores to maintain the weight while minimising the gold content.

In addition to material-level deception, counterfeiters focus on exact duplication of product features. To create the same look and feel, they will reverse engineer products or use 3D printing to create dimensionally accurate molds.



Items are then packaged to replicate branded assay cards with tamper-evident seals, and sometimes even security features. These fakes are then introduced into the market through online platforms, informal dealer networks, and sometimes through compromised points in the formal distribution chain.

Counterfeiters also forge documentation to misrepresent a product’s origin, purity, or value. When paired with convincing physical counterfeits, this documentation can pass initial checks, especially in fast-paced transactions.

Without confidence in the paper trail, even genuine metals can lose market value.

The Detection Dilemma: Keeping Pace with Counterfeiters

The increasing sophistication of counterfeiters, leveraging AI and advanced technologies, has rendered traditional detection methods insufficient. Reliance on outdated verification tools leaves even experienced professionals vulnerable, highlighting the urgent need for modernised detection strategies.

Detection tools vary in complexity, but each comes with trade-offs. No single method offers complete certainty, particularly against well-executed fakes.

Even when combined, these tools can’t always detect a counterfeit product made from real gold but bearing fraudulent markings or paperwork. To break this reactive loop, the industry needs more than incremental upgrades. It requires proactive investment in advanced authentication technologies, real-time data sharing, tighter integration across the supply chain, and coordinated global standards.

Security Features and Emerging Technologies: A Layered Approach to Deterrence

Given the limitations of traditional testing, especially for on-the-spot verification, security features have become a critical line of defence.

	Overt	Covert
Advantages	Marketing opportunities, sometimes lower cost	Invisible, higher security, adaptable
Disadvantages	Easily replicated, changes to product, harder to modify	Sometimes complicated to implement and authenticate
Examples	Holograms, Optical Variable Ink (OVI), QR Codes	UV + Other Security Inks, RFID + NFC Tags

Their effectiveness, however, depends on thoughtful implementation and how easily they can be exploited or verified.

Overt security features are designed to reassure consumers and demonstrate authenticity at a glance. While they can boost trust and enhance brand perception, they are also easier for counterfeiters to replicate. Conversely, covert security features are hidden from view, and therefore, are more difficult to duplicate.

The ultimate consideration is cost and complexity, as security features often require investment in supporting infrastructure, training, and device integration for reliable market operation. However, the rapid advancement of technology is yielding promising, scalable, and high-integrity tools that will complement current detection methods and security features.

Artificial intelligence (AI) tools, for example, can analyse images, data, and packaging details in real time, flagging subtle irregularities that might escape human notice. These systems can identify anomalies such as stamping inconsistencies, unusual patterns, or deviations in labelling and design, ultimately

boosting the accuracy and speed of inspections across the supply chain.

Blockchain offers significant potential for enhancing transparency and traceability. By recording each transaction and movement in a permanent, tamper-resistant ledger, blockchain enables stakeholders to verify the origin, ownership, and journey of a product throughout its lifecycle.

Companies and institutions across industries are actively investing in R&D to develop smarter, more integrated authentication systems. The goal is to create solutions that scale efficiently, from refinery operations to retail environments, and ultimately to the end investor. Together, these tools form a digital and physical infrastructure that can adapt to future threats and strengthen trust across the entire ecosystem.

LBMA’s Gold Bar Integrity Ecosystem: Raising the Bar on Security and Traceability

LBMA is setting a new standard in anti-counterfeiting efforts through its Gold Bar Integrity (GBI) Ecosystem, which focuses on strengthening traceability and authentication throughout the supply chain.

The GBI Database, powered by aXedras’ distributed ledger technology (DLT), is central to the Ecosystem. It enables secure tracking of gold bar movement and provenance by consolidating data from London Vault Holdings and Good Delivery List (GDL) Refiners. Launched in January, the platform is rapidly expanding, aiming for complete GDL Refiner integration by year-end. Custodians are also participating by submitting monthly aggregate vault holdings, helping ensure centralised oversight of physical gold stored in London.

Another core element of GBI is the accreditation of physical security features that support bar-level authentication. Approved features, together with standard bar markings, populate the GBI Database with details such as serial number, assay, brand, production date, and end-of-life data. Refiners are responsible for applying the feature during production. Vaults may integrate it into existing stock where needed.

These features underwent evaluation beginning in 2021 and were required to meet the strict criteria detailed in the checklist below.

To date, eight providers have been accredited, including AlpVision, SICPA, and the Royal Canadian Mint. Most use high-resolution image analysis, capturing the unique surface patterns of each bar without altering its physical composition. Others use micro-attachments or surface treatments that are similarly non-invasive.

Ease of adoption is central to LBMA’s approach. Many technologies work with standard equipment, such as smartphone cameras or barcode scanners, reducing the need for new infrastructure. For example, AlpVision’s Fingerprint technology enables mobile-based verification, allowing users to authenticate bars through an app without modifying the metal.

Securing the Future Through Shared Responsibility

Technologies such as blockchain, digital fingerprinting, and advanced security features are reshaping how the precious metals industry combats counterfeiting. But technology alone is not a complete solution. Lasting protection depends on collaboration across the entire global supply chain.

That includes strong coordination between industry players, regulators, and law enforcement. Organisations such as LBMA and the World Gold Council are helping to align the industry around common standards for authentication, traceability, and enforcement.

The Security Feature must...

- ✓ not significantly affect the integrity or quality of the bar in terms of weight or purity.
- ✓ be applied during the production of the bar and prior to storage or dispatch.
- ✓ be robust and readable for the lifecycle of the bar.
- ✓ be readable under normal vault conditions.
- ✓ not require significant investment in additional reading or handling equipment.
- ✓ be readable using existing technology such as bar code readers or high-resolution cameras.
- ✓ be adaptable to ensure future proofing + will adapt to ensure that unforeseen threats are mitigated against.
- ✓ not significantly add to the production costs of the bar.

Source: LBMA

Provider	Technology Type	Intended Use
Alitheon	High Resolution Image Analysis	Wholesale & Retail
AlpVision	High Resolution Image Analysis	Wholesale & Retail
Blockhead Technologies Ltd.	High Resolution Image Analysis	Wholesale & Retail
Dynamic Element AG	High Resolution Image Analysis	Wholesale & Retail
Royal Canadian Mint	High Resolution Image Analysis	Wholesale & Retail
SICPA	Micro-attachment	Retail
trueGold	Topical Application	Wholesale & Retail
Valcambi	High Resolution Image Analysis	Wholesale & Retail

Source: LBMA

Education is just as important. Consumers and investors need a clearer understanding of the risks, including the broader consequences of counterfeiting, such as financial loss and links to organised crime. Better awareness leads to smarter decisions and increases pressure for stronger regulation and accountability.

No single entity can address this challenge alone. But through cooperation, transparency, and a shared commitment to integrity, the industry can strengthen defences and protect its long-term credibility.



Lauren Moïse
US Sales and Operations, AlpVision

Lauren Moïse manages US sales and operations for AlpVision, a Swiss anti-counterfeiting technology company. Based in New York, she collaborates with brands across various industries to implement AlpVision’s solutions, which protect billions of products each year. Her previous research on luxury fashion product authentication, during her B.S. at the University of Georgia, served as a catalyst for her current role at AlpVision.



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Ensuring Excellence:

How LBMA Referees Uphold Gold and Silver Standards

By **Hannah Coakley**

LBMA Physical & Technical Services Officer

As two new Referees are selected to join LBMA's Referees panel, the Alchemist explores how their work upholds the quality of the physical bars which underpin trust in the precious metals industry.

If the Good Delivery List lies at the heart of the London bullion market, then LBMA's Referees are its heartbeat. The Referees act as the gatekeepers, upholding the highest standards in bullion production and certification.

LBMA was founded in 1987 to represent market participants and ensure quality refineries for the technical aspects of maintaining the Good Delivery List. In 2000, when Engelhard-Clal decided to close its Chessington refinery and lab, it began to make sense for LBMA to have more ownership of the technical accreditation process. And so, in 2001, LBMA invited all Good Delivery gold and silver Refiners, who were also LBMA Associates, to apply to become part of an expanded Referee's panel. The new panel was announced in 2003.

Who are the Referees and what do they do?

In March this year, after a long and rigorous process, Agosi AG and Gold Corporation (T/A The Perth Mint) were selected to join the existing panel of Referees. The existing panel comprises Argor-Heraeus SA, Metalor Technologies SA, MKS PAMP SA, Rand Refinery (PTY) Ltd, and Tanaka Kikinzoku Kogyo.

LBMA Referees – now numbering seven – carry out assays and chemical analysis of gold and silver to the highest possible levels of consistency, precision and accuracy. They also manufacture gold and silver reference samples, which are free from detectable inhomogeneity and assayed to very high levels of accuracy.

The LBMA Referees have demonstrated standards of assaying that are significantly above those required for other Refiners on the Good Delivery List. Only in this way is

it possible for them to manufacture the required reference samples and to test with sufficient reliability the samples provided by those being monitored.

Together, this group conducts the following essential activities:

Bar Testing

The most important area of work from the Referees is the examination and testing of sample bars provided by refiners which are seeking Good Delivery accreditation. After satisfying LBMA about the accuracy of its assaying ability, an applicant must submit unmarked large bars. These bars must comply with LBMA's Good Delivery criteria for both physical and chemical properties. After physical examination in a London vault, these bars are divided into two batches which are sent to two of the Referees for a more detailed examination and chemical analysis. The Referee and the applicant do not have any direct contact, and the Referees are never aware of the applicant's name at any stage of the process. This ensures complete anonymity.

The examination, testing and reporting on these bars by the Referees follows a long-established procedure which is carried out in two stages. The first stage involves weighing, visual inspection and the assay of cut samples with the second stage involving the melting and dip sampling of two of the bars and a full elemental analysis.

Proactive Monitoring (PAM)

The Referees cross-check assaying of the dip samples submitted by the GDL Refiners every three years as part of the PAM programme. These assaying and analytical reports provided by the Referees allow LBMA to decide whether the

Ruth Crowell announces Agosi AG and Gold Corporation (T/A The Perth Mint) as Referees of the Good Delivery programme at the Assaying & Refining Conference 2025.

Refiner has passed the technical requirements of Proactive Monitoring. This allows LBMA to give useful feedback to the Refiner regarding the fine tuning of its assaying work.

Proficiency Testing

Every year, the Referee working group decides the composition for the Proficiency Testing Scheme. This is discussed in great depth by the group and LBMA to ensure a challenging and exciting composition is available for the market to test each year. The manufacture and analysis of proficiency testing samples is prepared by the Referees panel.

Over the years we have seen good participation from both GDL and non-GDL laboratories and the number of labs achieving scores of < 2 is increasing, and general improvement can be seen on accuracy and precision.

New Silver Samples

The silver market has been extremely active during the past year and many silver refiners are keen to achieve LBMA Good Delivery accreditation. This means that there is an increasing demand for silver reference samples to test applicants. The Referees each agreed to manufacture up to five new sets of silver samples and this project is largely on the way to completion.

Reference Materials

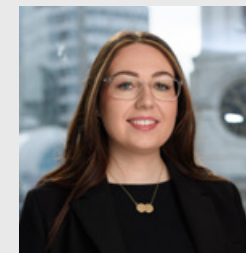
Members of the Referees working group have also been involved, together with other well-qualified GDL Refiners, in the development of Certified Reference Materials (CRMs). These materials are available to any laboratories wishing to calibrate their analytical equipment to LBMA standards. Since their initial manufacture in 2010, CRMs

have become an essential component of Good Delivery best practice, promoting quality and good practice in the refining and trade of gold and silver.

Look out for the new gold and silver CRMs in 2026.

Take a Look

LBMA's Visual Guide has just been refreshed, to better assist Refiners and vaults in understanding what is acceptable in London vaults. The Visual Guide also gives the market a consistent basis for evaluating the quality of bars received. See more on the LBMA [website](#).



Hannah Coakley

LBMA Physical & Technical Services Officer

Hannah joined LBMA in 2020 and leads on core physical and technical processes, including GDL Applications, Proactive Monitoring, Proficiency Testing, and the Visual Guide website. She is the key link between the department and its

stakeholders, managing relationships with the Vaults, Referees, and the Bank of England, to ensure the integrity and efficiency of these processes.

Before joining LBMA, Hannah spent six years in precious metals sales and trading, gaining valuable industry experience. She holds a BSc in Economics from the University of East Anglia.

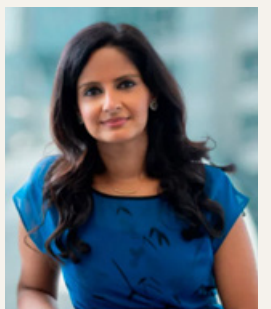
LBMA Updates

Farewell to Sakhila Mirza

It was with heavy hearts that we bade farewell last month to our Deputy CEO & General Counsel Sakhila Mirza, after more than a decade with LBMA.

Sakhila made remarkable contributions to the industry and within LBMA during her tenure. Joining as General Counsel in August 2014, becoming an LBMA Board Member in September 2016, and Deputy CEO in December 2023, Sakhila was a key figure in the LBMA team. Her dedication and commitment have been crucial in furthering LBMA's mission to ensure the highest levels of leadership, integrity and transparency for the global precious metals industry. She was also a wonderful colleague and extremely generous with her knowledge and time.

"Sakhila will be greatly missed but she leaves behind a lasting legacy, and we wish her all the very best in her next role," says Ruth Crowell (CEO, LBMA).



Open House Networking Event and Town Hall

Thursday, 22 May 2025 | 12:00 - 17:00 BST

Don't forget to register for our Open House Networking Event, taking place on Thursday, 22 May from 12:00 BST at the LBMA Office, which includes a Town Hall. This event also features a special Members' Query Surgery, offering a unique opportunity for personalised, one-on-one meetings with our knowledgeable staff, in which you can discuss any specific questions or concerns you have about our services, projects, or any other topics of interest. Get in touch or register: events@lbma.org.uk.

Upcoming events:

2 July 2025

LBMA Annual General Meeting

4 September 2025

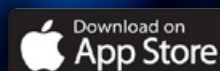
LBMA CEO Members' Town Hall



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Spotlight on **Auramet International Inc**

Auramet International Inc joins
LBMA as an Affiliate Member



5
QUESTIONS

5
ANSWERS

What were the reasons for you wanting to join LBMA and what do you see as the key benefits of membership?

We wanted to be affiliated with leading industry organisations that share our core values and provide us with a recognised platform to demonstrate that we meet all the high standards our industry demands. As a company that has long prided itself on its ability to build, maintain, and continuously improve relationships, Auramet wanted to formalise its connection with LBMA and help us ensure that the highest levels of integrity, transparency, and trust – qualities that LBMA has attained and promoted since its founding – are maintained.

Tell us about your company's role in the precious metals market?

Since 2004, we have been a leading global provider of physical precious metals trading and a

financial services company staffed on five continents with metal traders, former bankers, geologists, metallurgists, and mining engineers and lawyers. Auramet provides solutions that draw from decades of financial, commercial, technical, and legal experience. Through our longstanding and deep relationships, we provide an array of offtake, financial, hedging, logistical and advisory solutions individually tailored to our client base.

What's the background and history of the company?

The four founders of Auramet had worked closely together in the precious metals space for many years, during which time they collectively envisioned starting a relationship-driven company within the industry that offered best-in-class services to its clients. They launched Auramet in 2004 and spent the next two decades enhancing the relationships they had built earlier in their careers, developing new ones across the globe, and buying/selling precious metals in a safe, efficient and responsible manner.

What factors do you expect to impact your business in the short to long term?

Geopolitical uncertainty today, and in the near future, will continue to impact our business as we have seen unprecedented volatility in gold this year. However, as a liquidity provider, we are optimistic that this uncertainty means we will continue to have an important role to play in this space.

What are your future plans for the business?

Auramet wants to continue the measured but steady growth, client by client, that has defined our company over the past twenty years, leveraging the exceptionally experienced team we have in place while keeping a strong focus on maintaining the very highest levels of ethical standards that we demand from both our counterparties and ourselves.



Facing Facts

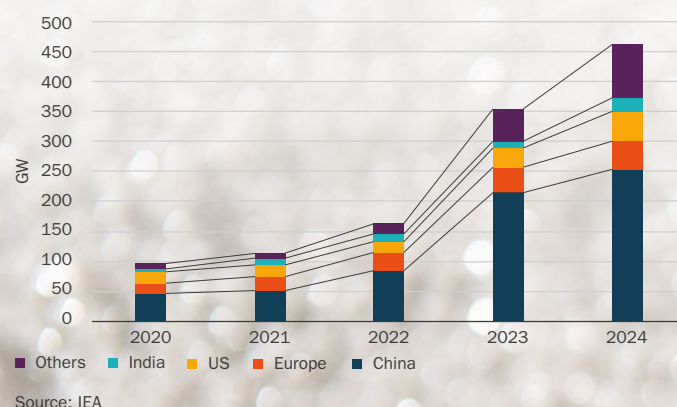
Silver Demand in Solar Photovoltaics to Leapfrog in the Next Five Years

By **Debajit Saha** Research Lead, Metals, London Stock Exchange Group

Solar photovoltaic (PV) modules have become one of the most widely used sources of electricity over the past two decades. In the last five years, the industry has experienced exponential growth, making solar energy increasingly competitive with other renewables such as hydropower and wind. According to the International Energy Agency (IEA), solar photovoltaics are projected to surpass all other renewable energy sources by 2030. Currently, solar energy accounts for 6.8% of global renewable energy production.

The signing of the Paris Climate Agreement marked a turning point for renewable energy demand. As part of efforts to curb global temperature rise, signatory countries committed to reducing carbon emissions and greenhouse gases. Initially, hydropower and wind energy gained momentum, but solar power has rapidly caught up, driven by ease of installation and cost-effectiveness.

Major Solar Power Producing Countries



What began with rooftop solar installations has expanded into the development of large-scale solar parks. In just the past two years, China has installed an impressive 470 GW of solar power—far exceeding its total capacity from the previous decade. Major European economies, led by Germany, added 89 GW during the same period, while the United States installed 81 GW. Meanwhile, emerging markets such as India and Brazil are also making rapid advancements in solar capacity expansion.

Silver in Photovoltaics

Silver is widely recognised for its exceptional electrical and thermal conductivity, making it a crucial component in photovoltaic (PV) cells. The use of silver paste in conductive layers significantly enhances the energy output of solar cells, while the metal's corrosion resistance ensures the longevity of solar panels, even in extreme temperatures and high-humidity environments.

In 2023, silver demand for solar panels reached approximately 197 million ounces (Moz)—a 77% year-on-year increase. This upward trend continued into 2024, with total demand estimated at 257 Moz, marking an additional 31% growth from the previous year.

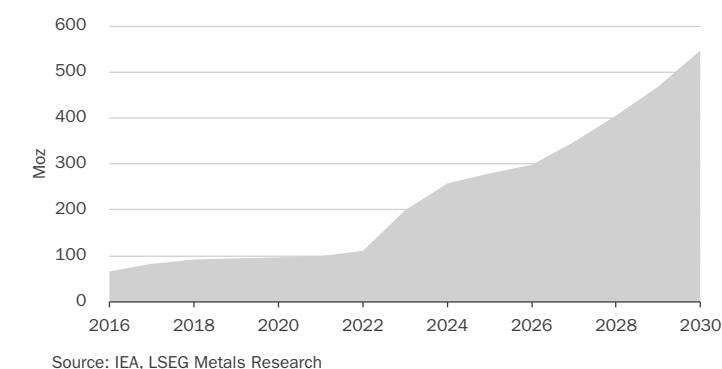
The massive expansion of solar capacity over the past two years signals a strong global shift toward green energy, with many nations still in the early phases of this transition. In the United States, total solar power capacity now stands at around 210 gigawatts (GW), supplying approximately 6% of the country's electricity. The US government's goal of achieving carbon neutrality by 2035 is expected to accelerate the expansion of solar infrastructure further.

Similarly, Europe's climate commitments and efforts to reduce dependence on foreign energy sources suggest continued growth in solar adoption. Meanwhile, India has set a target of adding 500 GW of renewable energy capacity by 2030, having already developed 64 GW of solar power, eyeing 100 GW by the end of 2025. Current projections indicate that this could rise to 300 GW by the end of the decade.

With a compound annual growth rate (CAGR) of 16%, silver demand for photovoltaic technology is projected to reach 546 Moz by 2030. This rapid increase in industrial demand, primarily driven by solar energy expansion, has already contributed to a market deficit of 184 Moz in 2023.

As solar power adoption accelerates, this supply deficit is expected to widen further, raising concerns about the long-term availability and pricing of silver for renewable energy applications.

Silver Demand in Solar Photovoltaics (Current and Forecast)



Debajit Saha

Research Lead, Metals, London Stock Exchange Group

Debajit is a Lead Analyst at LSEG, based in Mumbai. He is responsible for precious metals research in Asia, Middle East. He has a bachelor's degree from the University of North Bengal, India.

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