

drive the formation of an industrially important feedstock chemical. This insight promises to lead to the development of improved gold catalysts for the chemical industry.

Separately, researchers at Missouri University of Science and Technology have developed a new way of using gold to transform “flexible” or **wearable technology** ¹⁷. By growing thin layers of gold on a single crystal wafer of silicon, they discovered that they could preserve all the positive characteristics of silicon while adding the benefit of gold’s greater durability and flexibility.

Supply

Gold supply contracted sharply in Q1: down 12% y-o-y to 1032t. Lower levels of recycling and continued net de-hedging by producers explain the drop; mine production was virtually unchanged.

- Mine production of 764t was little changed from Q1 last year (767.8t), supporting our view that production will remain broadly steady before tailing off

- A third consecutive quarter of de-hedging by producers reduced the global hedge book by a further 15t

- The 21% y-o-y fall in recycling was largely due to the comparison with a very strong Q1 2016

Tonnes	Q1'16	Q1'17	YoY
Total supply	1,175.2	1,032.0	▼ -12%
Mine production	767.8	764.0	▼ 0%
Net producer hedging	47.5	-15.0	-
Recycled gold	360.0	283.0	▼ -21%

Mine production

Miners supplied 764t of gold to the market in the first quarter of the year, fractionally below the 767.8t produced in Q1 2016. There were areas of growth, largely from new mines: the US and Suriname both saw increases from projects that came on stream over recent months. The additive impact from these markets, however, was offset by weakness elsewhere.

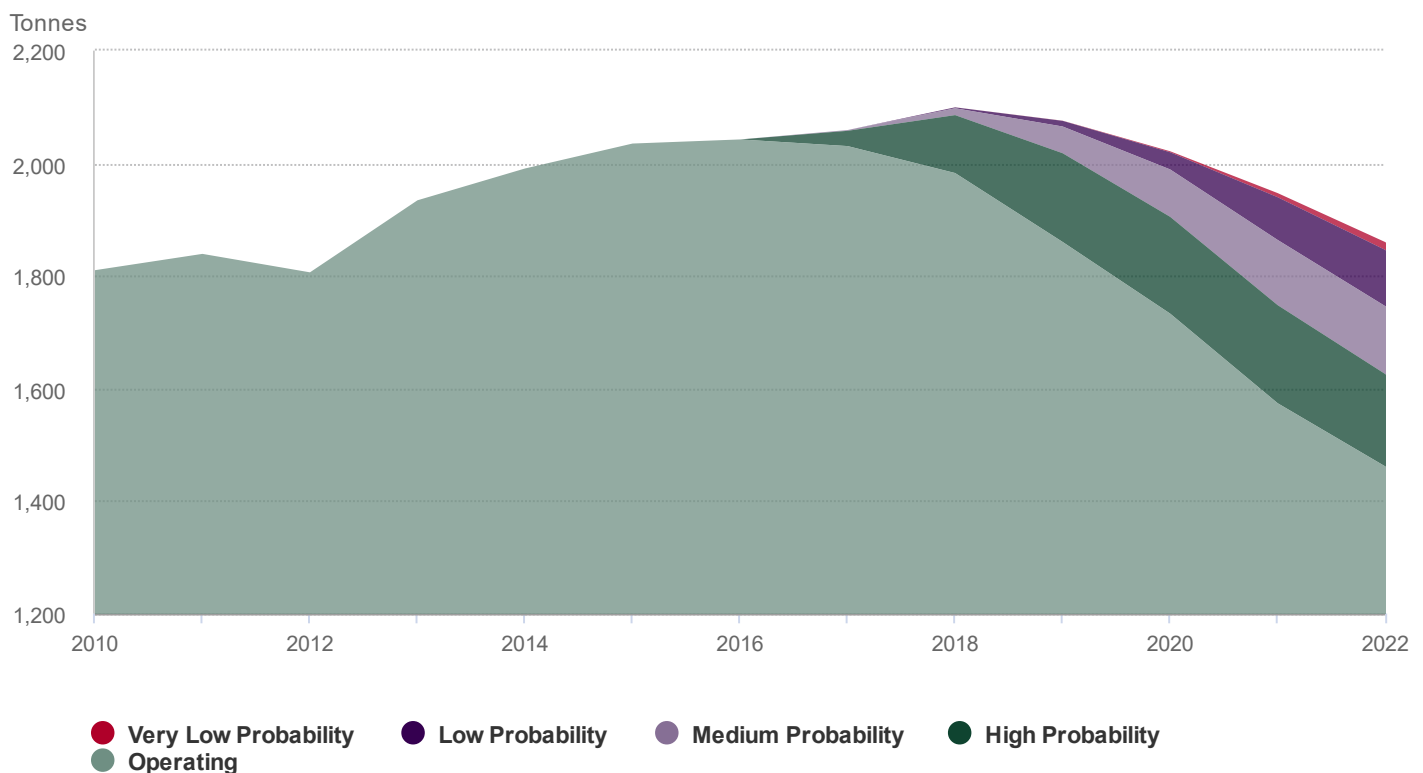
Mining lower-grade ore at Mongolia's Oyu Tolgoi copper mine resulted in a gold output reduction of around 3t. In China, extended New Year holidays at some refineries and mining companies cramped supply, as did the imposition of strict environmental management restrictions: together, these two factors knocked around 2t off Chinese gold production y-o-y.

But by far the largest impact on Q1 mine production came from Indonesia, thanks to a more than 8t fall in production from Grasberg. Production was cut back by around 60% to match domestic smelting capacity, after Indonesia introduced new restrictions on exports of unrefined metal.¹⁸ Freeport-McMoRan – Grasberg's operator - was granted a reprieve on 21st April in the form of a six-month temporary export licence. But this issue is far from resolved, and negotiations between the two parties continue.

Despite the wrangling, Grasberg is moving into a period of high-grading and will ramp up production over the next several quarters. This, along with a few smaller projects coming on-stream – particularly in Canada and Australia – will nudge global production higher in 2017 and 2018. But the effect will only be temporary.

Having plateaued in recent years, mine production will soon enter a period of decline. The production profile of currently operating mines shows a relatively steep drop-off over the next 5 to 10 years. Even factoring in high-probability projects (those highly likely to reach commercial production), the fall in production is still significant.

Mine production likely to drop beyond 2018 as the project pipeline is squeezed



Note: Probability weighting is as follows: operating (99.5%), high (95%), medium (50%), low (25%) and very low (15%). This chart comprises data for 700 mines and projects, collectively accounting for around 60-65% of global mine supply between 2010 and 2016. Unidentified and informal/artisanal gold production is excluded.

Source: Metals Focus Database of Mines; World Gold Council

This is largely a consequence of sharp cuts in capital expenditure over recent years (total capex for companies in the HUI Index¹⁹ declined 65% between 2012 and 2016²⁰), as well as a lack of significant discoveries. We have seen this before: lower prices in the late 1990s and early 2000s also negatively impacted production and exploration in the years that followed. And while there are signs of renewed interest in brownfield development and extending the life of existing mines, these are not yet sufficient to offset the steep cuts in project development spending of recent years. Inevitably, the supply pipeline will be squeezed.

The speed at which production will fall is uncertain. As existing reserves are depleted, the current project pipeline will be unable to replace them fully. Over the long-term, the global production profile will depend on the trajectory of the gold price and potential exploration upside, particularly the speed with which brownfield exploration can be brought into production.²¹

Net producer hedging

Gold producers reduced their overall net hedge positions by 15t in Q1. This compares with positive net hedging of 47.5t in Q1 2016.

In the first half of 2016 a rising dollar gold price coupled with weakening local currencies encouraged greater levels of net hedging as gold producers sought to lock in higher prices for their output. But the increase in the Q1 2017 gold price provided little temptation, particularly as prices stayed below average 2016 levels.

Project financing and/or debt repayment are key reasons why many miners opt to hedge, despite the practice being generally opposed by many shareholders. Our view is that while higher price levels may elicit more producer hedging, it will remain tactical in nature and small by historical standards. Any hedging would likely remain in line with the annual average of 16.7t

since 2011, vs the 344.8t average between 1995-1999. At the end of Q1, the global hedge book stood at 237 tonnes, an almost insignificant level when compared to the 3,000t plus hedge book of the late 1990s.

Recycling

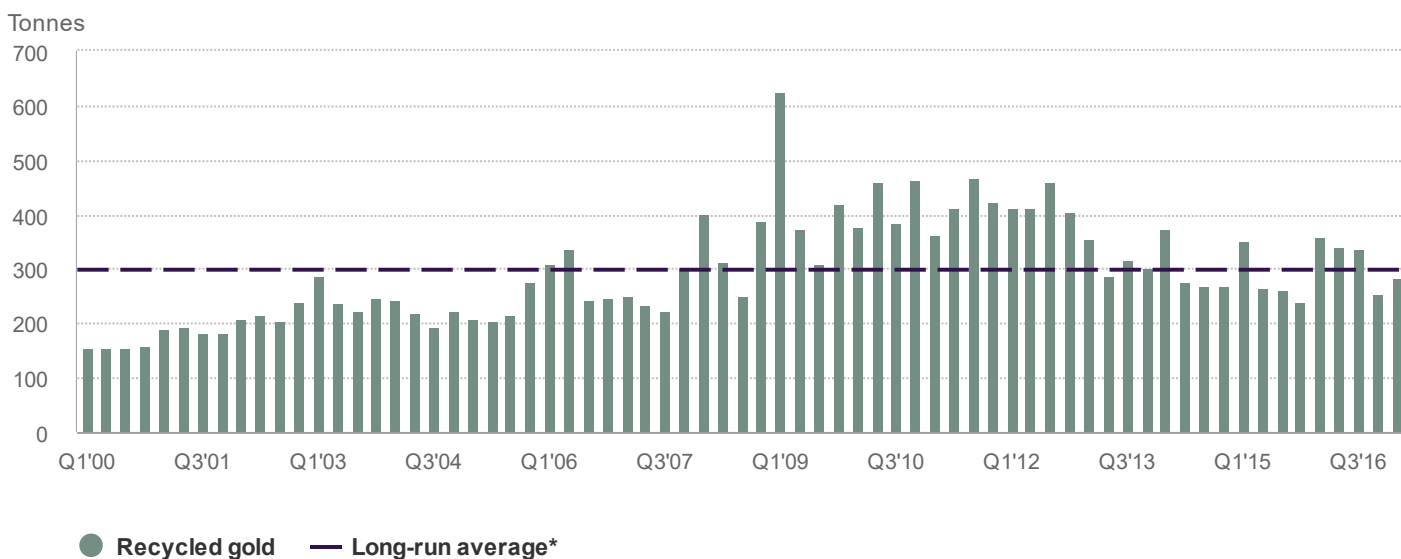
Recycling contributed 283.0 tonnes to supply in the first quarter, a drop of 21% from Q1 2016. The steep y-o-y decline is largely due to recycling having jumped in Q1 2016 in response to sharply rising gold prices at that time. At 283.0 tonnes, recycling is below its long-run average (since Q1 2000) of 296.2 tonnes.

Much of the decline in recycling activity came from Southeast Asian markets – Thailand and Indonesia in particular – where local currency weakness in Q1 2016 exaggerated the rise in the US\$ price. Turkey also witnessed far lower levels of recycling during the most recent quarter. Price and currency moves played their part here too, but the constitutional referendum was also a factor: the populace was reluctant to sell its gold holdings in the face of an uncertain political outcome.

Indian recycling has been remarkably subdued since November’s shock demonetisation. Retailers remained short of cash for some time, slashing their available funds to buy back holdings of old gold. The market remains in something of a holding pattern ahead of the government’s GST decision. Once that becomes evident we could see a resurgence in recycling.

Recycling levels during the first quarter can be seen as something of a ‘normalisation’ in the absence of sharp price moves. Given that recycling supplies were elevated throughout much of last year, negative comparisons are likely over the next two quarters at least.

Q1 recycling was 21% down on last year's relatively high level



*Long-run average covers Q1'00 to Q4'16.

Source: Metals Focus; GFMS, Thomson Reuters; World Gold Council

Footnotes

1. In November 2016, the Indian government implemented a surprise demonetisation that removed Rs15.44trillion (or 86% of the currency in circulation) from India's economy. For a review of India's recent policy initiatives and the likely implications for gold demand, see our [Market Update: Indian demand will recover from 2016's lows](http://www.gold.org/research/indian-demand-will-recover-from-2016-lows)
<http://www.gold.org/research/indian-demand-will-recover-from-2016-lows>
2. Read more: <http://corporates.bseindia.com/xml-data/corpfiling/AttachHis/4822c9d4-9583-4ce1-be76-a5c1a8a8499a.pdf>
3. The new lunar 'year of the rooster' contains a leap month in order to bring it into line with the solar calendar. This means that it encompasses the 'Start of Spring' day in both February 2017 and February 2018.
4. World Gold Council, 2016: [China's gold market: new perspectives on consumer behaviour](http://www.gold.org/research/china-jewellery-market-new-perspectives)
<http://www.gold.org/research/china-jewellery-market-new-perspectives>
5. Agility Research & Strategy; [Affluent Insights Luxury Study 2017](http://www.luxurysociety.com/en/articles/2017/04/top-3-priorities-affluent-asian-millennials/)
<http://www.luxurysociety.com/en/articles/2017/04/top-3-priorities-affluent-asian-millennials/>
6. Read more: <http://www.decent9999.com>
7. Read more: <http://www.pressreader.com/thailand/bangkok-post/20170209/281973197396310>
8. World Gold Council, November 2016; [Gold Demand Trends Q3 2016](http://www.gold.org/supply-and-demand/gold-demand-trends/back-issues/gold-demand-trends-q3-2016/focus-us-jewellery) <http://www.gold.org/supply-and-demand/gold-demand-trends/back-issues/gold-demand-trends-q3-2016/focus-us-jewellery>
9. Read more: <http://www.gold.org/supply-and-demand/gold-demand-trends/back-issues/gold-demand-trends-q1-2017/jewellery>
10. Read more: http://news.xinhuanet.com/english/2017-02/08/c_136041055.htm
11. Read more: <http://www.gold.org/statistics#reserves-statistics>
12. Read more: <http://www.reuters.com/article/turkey-cenbank-gold-idUSL5N1H53VN>
13. 3D packaging increases the memory capacity of a flash chip in a smaller space, offering lower cost per gigabyte and greater durability.
14. A vertical-cavity surface-emitting laser (VCSEL) is a type of semiconductor-based laser diode that emits a highly efficient optical beam vertically from its top surface.
15. Chip Scale Packaging (CSP) is suitable for use in automobile lighting as it can more easily withstand a vibrating environment. It also has the advantages of reduced size and, as it does not use gold, costs less.
16. Malta et al., Science 31 Mar 2017: Vol. 355, Issue 6332, pp. 1399-1403. DOI: 10.1126/science.aal3439
17. Read more: <http://gadgetsandwearables.com/2017/03/20/gold-wearable-technology/>
18. The restrictions applied to exports of copper concentrate and anode slimes, among other things. As Grasberg is primarily a copper mine, with gold produced as by-product, production of gold was affected.
19. HUI Index is an equally-weighted index of some of the world's largest gold mining companies. Its full title is the NYSE Arca Gold BUGS Index.
20. Bloomberg

21. Please see Full Year/Q4 2016 Gold Demand Trends <http://www.gold.org/supply-and-demand/gold-demand-trends/back-issues/gold-demand-trends-full-year-2016> for more detail.