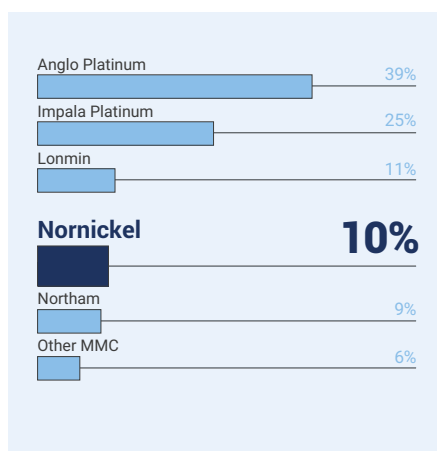


PLATINUM

No. 4 in platinum production¹



Source: Company data

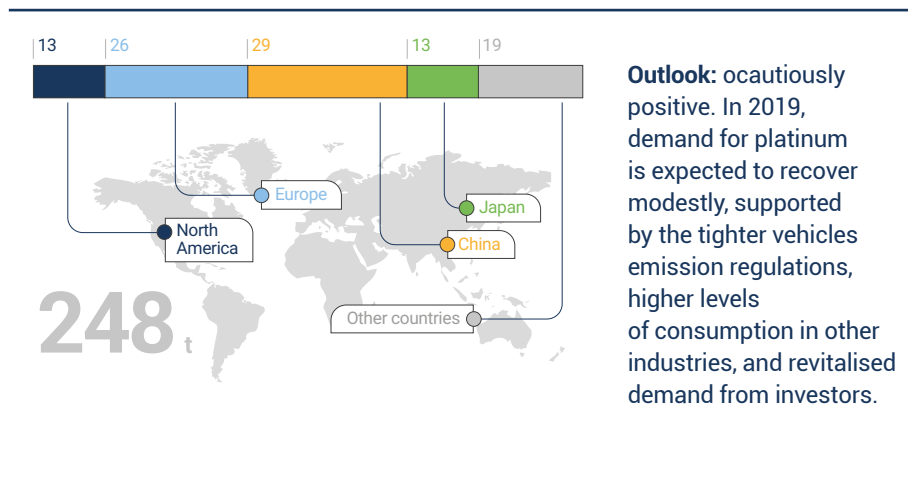
¹ Refined metal including from own feedstock under tolling agreements at third-party facilities.

Key trends in the platinum market

2018 The year saw the market gradually moving into a surplus amid a decline in consumption in the automotive and jewellery industries and weakness

in investor demand. Platinum consumption by other industries also decreased, however this was largely offset by significant growth in the chemicals and glass sectors.

Platinum consumption by region (%)



Outlook: cautiously positive. In 2019, demand for platinum is expected to recover modestly, supported by the tighter vehicles emission regulations, higher levels of consumption in other industries, and revitalised demand from investors.

Source: Company data

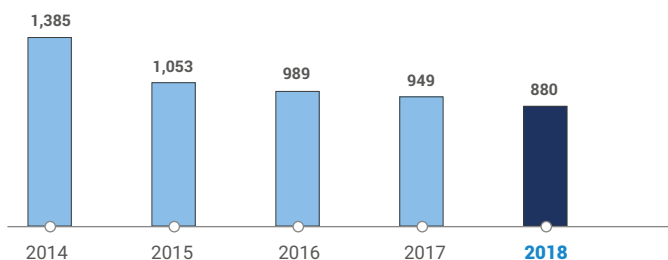
In 2018, platinum prices faced downward pressure with the main decline registered between January and early September when the price slid from USD 1,019 per oz. to USD 774 per oz. (the average of LBMA AM and PM Fix) – the lowest since 2008. This was followed by a period of stabilisation, with the price at 794 per oz by the end of the year.

In the reporting period, platinum and gold prices moved closely together, indicative of platinum prices being highly dependent on the macroeconomic backdrop, which was largely unfavourable for precious metals last year. The pressure primarily came from the USD, which gained in value against the basket of major

currencies driven by the Fed's hawkish stance on interest rates. While inflation expectations were low, investors were in no rush to move to the safe havens of precious metals.

Steady growth in the stock market between February and early October (S&P 500 up 9%) and high bond market yields (the average yield on 10-year US Treasuries in the reporting period was 2.9% against

Average annual platinum prices (USD/oz)



Source: LBMA Platinum price

2.3% a year earlier) diverted investor attention from precious metals.

On top of that, platinum consumption in the Chinese jewellery industry was hit by the threat of a trade war and economic slowdown in China.

Despite the general trend, the period from March through June and especially December saw platinum price lagging behind gold which resulted in a widening gold-platinum spread. While at the year's outset platinum traded 30% lower against gold, by the end of 2018 the gap reached as much as 40%, driven by the platinum market fundamentals and speculative pressure.

The main fundamental drivers included a drop in platinum consumption by the automotive industry due to reduced share of diesel passenger cars in the key markets (primarily, in Western Europe), no awaited recovery in demand from Chinese jewellers, and primary production not being too receptive to low prices.

Speculation was another big negative factor, with investors betting on a downward metal price trend. Between March and September, short positions in platinum on NYMEX increased threefold to 87 tonnes, falling back later to the levels observed at the beginning of the year. At the same time, long positions remained stable during the entire reporting period. Despite the record-low prices, investor demand was weak, with the outflow of investments from ETFs putting additional pressure on the price.

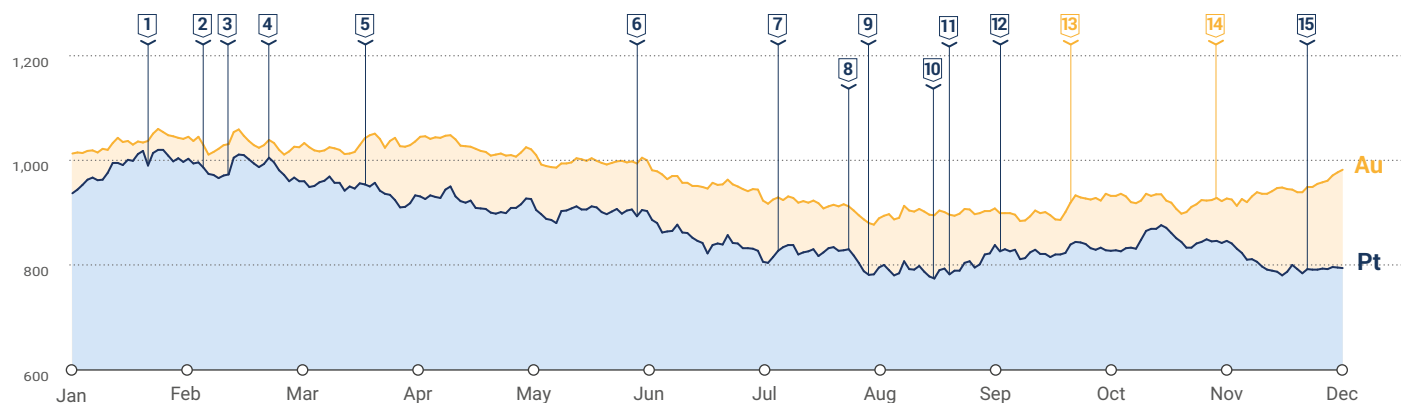
The prevailing negative sentiment dragged down the average platinum price in 2018 to 14-year lows (USD 880 per oz), down 7% from the previous year.

The platinum price stood at

USD 794 per oz.

at the end of 2018

Key industry developments and platinum price in 2018 (USD/oz)

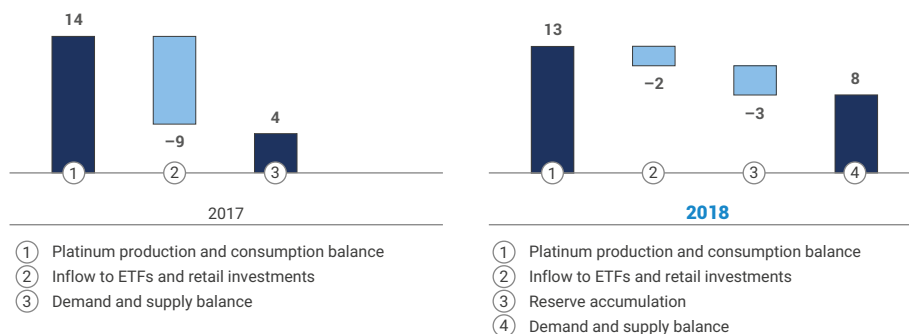


- | | | |
|--|---|---|
| 1 > Speculative long positions on NYMEX reached the annual peak | 7 > US imposed first round of tariffs on Chinese goods | 10 > EU introduced the new WLTP emissions test cycle |
| 2 > Dow Jones sank 11% | 8 > Impala Platinum announced a restructuring plan for the Lease Area (Rustenburg), providing for production cuts in the medium term | 11 > Long speculative positions on NYMEX hit the year's lows |
| 3 > Dow Jones regained 8% | 9 > The US Dollar Index reached local highs of 97 p. | 13 > Dow Jones reached all-time high |
| 4 > US released weak car sales data for February | | 14 > South Africa's competition authorities approved Sibanye-Stillwater's takeover of Lonmin |
| 5, 7, 14, 19 > US Federal Reserve raised interest rate | | |

Market balance

The platinum market saw a surplus in 2018 as production of platinum exceeded consumption, though part of the extra supply was absorbed by demand from investors.

Platinum market balance (t)



- ① Platinum production and consumption balance
- ② Inflow to ETFs and retail investments
- ③ Demand and supply balance

- ① Platinum production and consumption balance
- ② Inflow to ETFs and retail investments
- ③ Reserve accumulation
- ④ Demand and supply balance

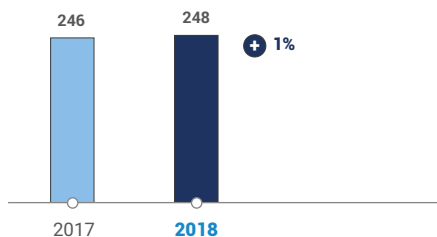
Source: Company data

8 t

of surplus in the platinum market in 2018

Consumption

Platinum consumption (t)



Source: Company data

Industrial consumption of platinum in 2018 rose to 248 t, up by 2 t (or 1%) y-o-y.



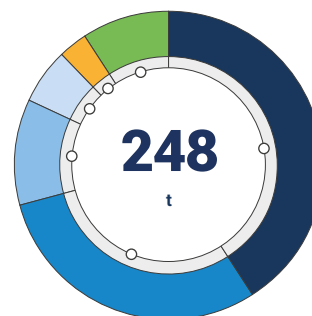
The automotive industry is the main consumer of platinum. Over 80% of platinum in this industry is used to manufacture exhaust gas catalysts for diesel vehicles.

In 2018, platinum consumption in the automotive sector decreased y-o-y by 5.6 t, which mainly had to do with a decreased share of diesel vehicles in their key market – Europe. The market share of diesel cars in Europe (27 countries) dropped from 44% to 36% y-o-y, the lowest since 2001.

Diesel engines are giving way to petrol-based solutions, and more expensive vehicles utilise hybrids (combining petrol and electric engines). Lower platinum consumption by car makers was partially offset by increased manufacturing of heavy-duty vehicles (up 2% y-o-y), catalytic devices of which still rely on platinum.

Diesel engines, together with hybrids, are the key and most cost-efficient solutions to achieve the EU's targets for reducing CO₂ emissions to 95 g/km by 2020. New diesel cars comply with the existing environmental

Platinum consumption in 2018 by industry (%)



	%	t
Exhaust treatment systems	41	101.6
Jewellery	30	74.0
Chemical catalysts	11	26.8
Glass production	6	14.5
Electronics	3	8.5
Other	9	22.4

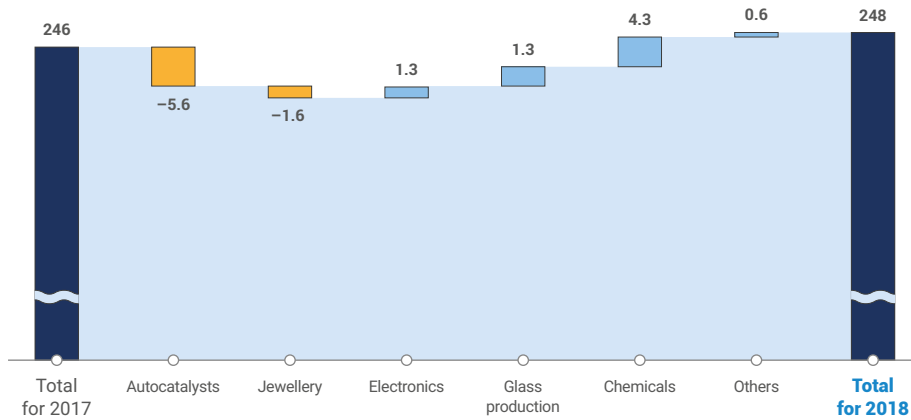
Source: Company data

1%

growth in the industrial consumption of platinum in 2018



Platinum consumption by application area (t)



Source: Company data

requirements, and automakers are working hard to restore confidence towards them, which may result in increased platinum consumption in the automotive industry.



The second biggest platinum consumer is **the jewellery industry**, accounting for a third

of the demand. The reporting period saw a sustained declining trend of platinum consumption in the industry (down 1.6 t) that set in during the previous years. The decrease was primarily driven by lower jewellery demand in China due to consumers switching to other forms of investing and the falling demand for luxury goods

amid fears about the country's economic performance. While China is currently facing growing competition in the platinum jewellery sector from gold items, other major markets (India, Japan, USA, and Europe) are enjoying increased platinum jewellery sales.



Chemicals. In 2018, primary platinum consumption in industrial catalyst

manufacturing increased by 4.3 t, following the ramp-up of oil processing in Japan and other countries in Asia, growth of chemicals production in Western Europe and China, including the launch of new

plants to produce nitric acid, paraxylene, silicone and other basic chemicals.



Glass. Platinum is needed to produce glass fibre and optical glass.

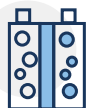
In the reporting period, the industry's demand for platinum continued to grow (up 3.1 t), in line with the trend observed over the past five years. In recent years, glass fibre has been used in construction, renewable energy (as material for wind power plants), as well as in the automotive industry, where some metal parts of the car body are increasingly replaced by glass fibre equivalents. This accelerated the pace

The second biggest platinum consumer is **the jewellery industry**, accounting for **a third of the demand**

at which new glass fibre manufacturing facilities were put into operation – first and foremost in China. Moreover, platinum is used along with rhodium in glass melting machines to produce LCD screens for many electronic devices. The robust growth in the consumer electronics sector over the recent years has led to the opening of many new LCD production facilities in Asia. An increase in the rhodium price premium to platinum is expected to potentially force glass melting equipment manufacturers to switch to higher platinum content alloys.



Electronics. The electronics industry saw a modest rise in platinum consumption (up 1.3 t) triggered by an increase in the platinum-based hard drive production due to the expansion of remote data storage capacities. However, in the personal computer sector hard drives are phased out for solid-state drives, which ensure better performance in PCs and mobile devices, but are too expensive to be used in data storage and processing centres.



Fuel cell production in recent years, platinum consumption in proton-exchange fuel cells, used in motor vehicles and stationary power plants, has been on the rise, reaching about 1.5 t in 2018. Major automakers like Toyota, Daimler, and Hyundai have launched sales of fuel cell vehicles (FCV), while China is actively developing fuel cell-powered buses manufactured by Yutong and other companies.

FCVs, just as the fully electric cars powered by rechargeable batteries, produce zero emissions, but unlike them have a larger ranger (500 km and over) and can be refuelled faster.

The Japanese government has announced plans to boost FCV production in the run-up to the Tokyo Olympics in 2020. Meanwhile, China expects to increase the number of FCVs to 50,000 by 2025, bringing it to 1 mln by 2030. With each fuel cell containing about 20 g of platinum, the industry is well positioned to become a major consumer of the metal in the next 5–10 years. On top of that, several cities in China have declared themselves "hydrogen cities", with city authorities introducing special FCV and hydrogen energy support measures.



Investments. Platinum is also widely used as an investment instrument. Physical investments may vary from coins and smaller bars to investments in ETFs that accumulate large amounts of platinum in the form of standard-sized bars. In 2018, the demand for platinum bars from retail investors slightly rose (up 6 t) due to low prices and expectations of their growth. During the year, the investments in platinum ETFs fell by 7 t to 76 t.

1.5 t

consumption of platinum for fuel cell production in 2018

Each fuel cell contains

20 g of platinum

FCVs, just as the fully electric cars powered by rechargeable batteries, **produce zero emissions**

Production

Global production of primary refined platinum in 2018 decreased by 3 t (down 2%) y-o-y to 191 t.

In the reporting period, supply from South Africa, the world's largest platinum producer, declined slightly (down 0.6 t). Anglo American Platinum reduced output of refined metal, despite a significant growth in production both at own projects and under joint venture arrangements, as well as increased feedstock purchases from third parties. This was due to repairs at two smelters, which prevented the company from processing the entire volume of ore mined. As part of its programme to restructure and close down unprofitable mines, Lonmin also slightly reduced output.

At the same time, Impala Platinum, despite some technical problems in smelting, boosted refined metal production in 2018, and Northam Platinum significantly increased output thanks to processing the ore and concentrate inventories at the new smelter launched in the reporting period.

Russia recorded lower output (down 1.7 t), with continued production decline at the alluvial deposits in the Far East driven by the depletion of the mineral resource base. The negative trend was exacerbated by lower output from MMC Norilsk Nickel due to the termination of the third-party feedstock processing.

In Zimbabwe, output was close to the levels of previous years (down 0.2 t). A slight decline was recorded by Zimplats and Mimosa, with production returning to the 2016 rates. On the other hand, Unki reported a moderate growth in output.

Primary platinum production in Canada dropped by 0.7 t mainly due to lower output by the Vale and Glencore assets, which was only partially offset by higher output from North American Palladium. The US saw a rise in production by 0.2 t. Sibanye-Stillwater, the only palladium producer in the country, increased output owing to the recently launched Blitz project.

The main sources of recycled platinum include used exhaust gas catalysts and jewellery scrap. Recycled output in 2018 grew by 4 t to 69 t, chiefly due to higher automotive scrap volumes. Collection of autocatalyst scrap increased on the back of high prices for steel and other PGMs and growing recycling volumes of European diesel cars with a high platinum content in the catalysts.

The growth of recycling was hampered by difficulties in using new types of silicon carbide based diesel catalysts. Being a refractory material it can damage furnaces unfit to handle it. This requires processors to sort through catalysts and separately process the material with high silicon content, taking extra time and resources.

The sources of previously accumulated platinum stockpiles include trading companies, financial institutions, and surplus inventories of consumers, while the movement of these inventories is non-transparent.

Primary platinum production in 2017-2018 (t)

