

# PRECIOUS APPRAISAL

No. 28  
29<sup>th</sup> August 2022



- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 PLATINUM
- 05 PALLADIUM
- 06 RHODIUM, RUTHENIUM, IRIDIUM
- 07 TRENDS AND INVESTMENTS
- 08 ABOUT HERAEUS

## MARKET SPOTLIGHT

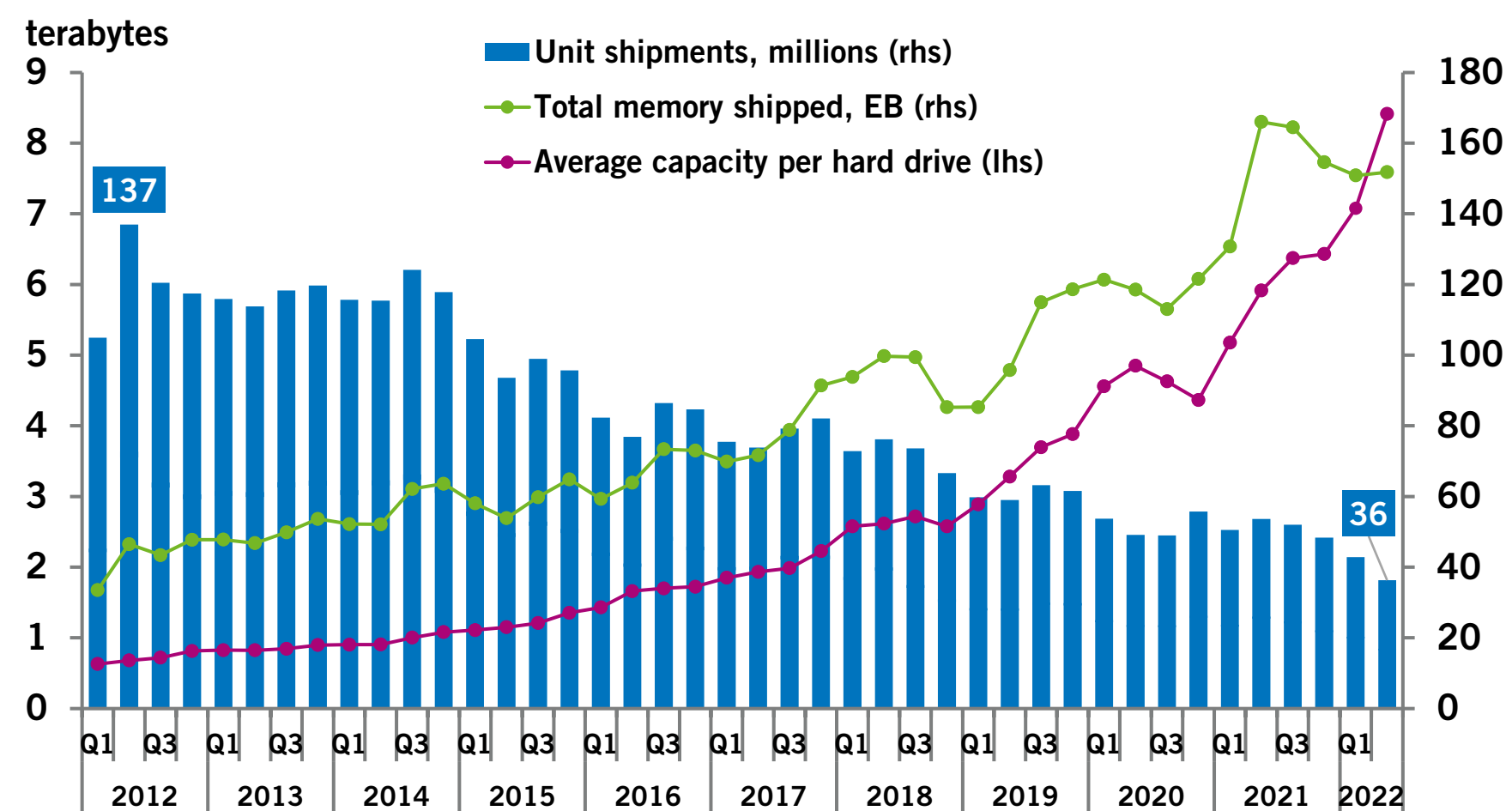
### Ruthenium demand in hard drives not yet nailed by HAMR

In terms of exabytes, hard drive disk (HDD) shipments grew in response to the pandemic while unit shipments remained flat. Total memory capacity shipped peaked in Q2'21 from Western Digital (WD) and Seagate (the two largest HDD producers, together making up the majority of the market) at 166 exabytes (EB) (note: 1 EB = 1 billion gigabytes). Unit shipments have been falling steadily since 2012, while the increase in memory capacity shipped is due to rapid growth in average memory size per hard drive.

**Increasing capacity of HDDs should be positive for ruthenium demand until heat-assisted magnetic recording (HAMR) becomes dominant.** High-capacity microwave-assisted magnetic recording (MAMR) drives tend to contain more ruthenium (+ platinum) coated platters than consumer units. Therefore, a growing market share of high-capacity drives is positive for ruthenium demand.

**Manufacturers have roadmaps to start shipping more HAMR HDDs (no Ru) in the next few years.** This will result in partial replacement of MAMR technology, though the actual memory capacity of MAMR HDDs shipped may continue to increase with overall demand for storage. Seagate leads the sector in bringing HAMR drives to market and is shipping to selected customers, with second-generation HAMR drives due in H2'23. Toshiba has plans to phase in HAMR in favour of some MAMR products from FY'25. Western Digital's perpendicular magnetic recording (ePMR) technology uses ruthenium similarly to MAMR units and is likely to begin to be displaced by HAMR from around 2026. In the meantime, some manufacturers intend to expand memory capacity using more ruthenium-containing components like platters. The platters in a hard drive are where the data is stored, therefore more platters equals more storage capacity. The major manufacturers have increased the number of platters in high-end HDDs from 7 to 10 in recent years; now both Toshiba and Western Digital plan to push the number up to 11 within the next 12 months.

Hard drive storage growth has outpaced slowing unit shipments



Source: SFA (Oxford), Western Digital, Seagate

**HAMR drives are challenging to roll out as more complicated components are required compared to MAMR technology.** HDDs currently account for approximately 7% of total ruthenium demand and global supply is estimated to be around 1 moz, >90% of which comes from South Africa. Spending on cloud storage infrastructure is forecast to grow by 22% this year (source: IDC), including on current technology that continues to use ruthenium, so ruthenium HDD demand is not at risk in the near term.

**The ruthenium price is on a downward trend** after spiking in 2021 when processing problems constrained refined output in South Africa. The long-term average ruthenium price of \$212/oz is less than half the current price of the metal. Ruthenium will likely continue to trend lower given the global economic slowdown forecast in H2'22 and into 2023, as consumer spending and industrial output are expected to wane.

## PRECIOUS APPRAISAL

29<sup>th</sup> August 2022

- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 PLATINUM
- 05 PALLADIUM
- 06 RHODIUM, RUTHENIUM, IRIDIUM
- 07 TRENDS AND INVESTMENTS
- 08 ABOUT HERAEUS

## PRECIOUS METALS REVIEW

### Gold

<sup>79</sup> Au	CLOSE	WEEKLY CHANGE	HIGH	DATE	LOW	DATE
\$/oz	1,737	-0.69%	1,766	25/08/2022	1,728	22/08/2022
€/oz	1,737	-0.30%	1,768	25/08/2022	1,728	22/08/2022

**Gold performs differently on each side of the Atlantic.** With the Fed much further ahead than the ECB in raising interest rates and the deteriorating economic situation in Europe, the dollar has been strengthening. The dollar index pushed to 20-year highs last week. The gold price fell 1.1% on Monday to \$1,733/oz, before recovering slightly, finishing the week at \$1,737/oz after finding support at around \$1,730/oz. As a result of the booming dollar and Europe's energy crisis, the euro fell below parity with the dollar for the first time since 2002. Natural gas prices have driven European inflation sky-high, with German gas prices posting record highs and reaching the equivalent of \$500/barrel of crude oil. Concerns that the surge in energy prices will force industry to curtail output, thus pushing the region's economy into a recession, weighed on the currency pair from the euro side as well. On the upside, for investors in Europe the weakening local currency has resulted in gold priced in euros outperforming the dollar price significantly this year, with year-to-date returns of 10%. As economic activity is weakening in the US and Europe, it is possible the Fed will take a more dovish path after the next meeting of the FOMC which could help to boost the dollar gold price.

## PRECIOUS APPRAISAL

29<sup>th</sup> August 2022

- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 PLATINUM
- 05 PALLADIUM
- 06 RHODIUM, RUTHENIUM, IRIDIUM
- 07 TRENDS AND INVESTMENTS
- 08 ABOUT HERAEUS

## PRECIOUS METALS REVIEW

### Silver



	CLOSE	WEEKLY CHANGE	HIGH	DATE	LOW	DATE
\$/oz	19.02	-0.59%	19.43	26/08/2022	18.72	22/08/2022
€/oz	19.02	-0.21%	19.40	25/08/2022	18.73	22/08/2022

**Polysilicon manufacturing left high and dry in Sichuan Province.** The world's largest polysilicon producer and major solar cell supplier, Tongwei, has had to stop production intermittently in recent weeks owing to a need to reduce the Chinese region's electricity demand, exacerbating supply concerns, and pushing polysilicon prices to reach new highs of \$45.4/kg. A hot, dry summer has resulted in reduced power generation capacity in Sichuan Province where the majority of electricity comes from hydroelectric plants. Polysilicon prices soared by 288% in 2020-2021 as demand for solar panels outstripped supply of the key material used in solar cell wafer production and after cooling slightly, surged again earlier this year. Consequently, solar cell prices have risen significantly, putting the commissioning of large solar projects, and therefore demand for the silver paste also used in cell production, at risk.

Tongwei currently produces ~30% of global polysilicon supply, and most of its production base is in Sichuan. Therefore, in the short term, global supply will be constrained and prices of solar cells will remain high. Later this year, significant additional production capacity is predicted to come online, potentially easing upward price pressure for solar modules and reducing expected CAPEX for large projects. Silver demand in photovoltaics accounts for around 10% of global silver demand and was 114 moz in 2021 (source: The Silver Institute). This is forecast to grow in 2022 as renewable energy sources retain government support.

Last week the silver price stayed below \$20/oz on the back of the strong dollar and possibly downward pressure from concerns over the potential for curtailment of industrial output in Europe.

## PRECIOUS APPRAISAL

29<sup>th</sup> August 2022

- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 **PLATINUM**
- 05 PALLADIUM
- 06 RHODIUM, RUTHENIUM, IRIDIUM
- 07 TRENDS AND INVESTMENTS
- 08 ABOUT HERAEUS

## PRECIOUS METALS REVIEW

### Platinum

<sup>78</sup> Pt	CLOSE	WEEKLY CHANGE	HIGH	DATE	LOW	DATE
\$/oz	875	-2.00%	893	23/08/2022	868	23/08/2022
€/oz	875	-1.98%	893	23/08/2022	869	22/08/2022

#### **This year's platinum oversupply could be smaller than expected.**

Headwinds in H1 have impacted producers' ability to achieve production targets. Anglo American Platinum's PGM production decreased by 4% owing to heavy rains impacting Mogalakwena mine early in the year. Sibanye-Stillwater (SSW) suffered several operational setbacks in the first six months of the year too, citing both internal (underground seismicity and poor ore material) and external (load-shedding and copper cable theft) factors that have contributed to its South African operations being just behind schedule to hit the bottom end of guidance for the year of ~1.04 moz of platinum. The company's South African operations achieved platinum production of 504 koz in H1'22, 12% lower than H2'21. Further disruption in H2'22 may lead to guidance being missed. Wage negotiations for SSW's PGM operations began in early August and provide some risk to production should any industrial action occur. Thus far, all other major PGM producers in South Africa have settled negotiations quickly with no disruption to metal output.

At the beginning of the year, the platinum market was forecast to be in a surplus of 1.1 moz. However, this has been reduced to ~750 koz owing to lower than expected mine supply combined with stronger industrial demand for platinum. Nonetheless, platinum is still a very liquid market. With investors showing little interest in ETFs, this could leave the platinum price subdued for the remainder of the year.

## PRECIOUS APPRAISAL

29<sup>th</sup> August 2022

- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 PLATINUM
- 05 **PALLADIUM**
- 06 RHODIUM, RUTHENIUM, IRIDIUM
- 07 TRENDS AND INVESTMENTS
- 08 ABOUT HERAEUS

## PRECIOUS METALS REVIEW

### Palladium

<sup>46</sup> Pd	CLOSE	WEEKLY CHANGE	HIGH	DATE	LOW	DATE
\$/oz	2,126	0.62%	2,207	26/08/2022	1,964	22/08/2022
€/oz	2,127	1.00%	2,192	26/08/2022	1,982	24/08/2022

**The Golden State goes electric.** Last week California voted to phase out all internal combustion engine (ICE)-only light vehicles by 2035. The legislation includes mandates for market share of zero emission vehicles (including battery electric vehicles (BEVs), hydrogen fuel cell electric vehicles (FCEVs) and the cleanest-possible plug-in hybrid electric vehicles (PHEVs) in the state starting with 35% in 2026. According to the California New Car Dealers Association, the market share of EVs in new light-vehicle registrations was 15.1% in H1'22. By ratifying this legislation, California has aligned itself with the EU's proposal for the EV transition. California tends to lead other US states with its emissions regulations, and therefore it is possible that others will follow with similar bans in the next few years. North America is the second-largest palladium autocatalyst market after China, consuming 1.5 moz in 2021, and California alone accounts for 12% of US sales. The transition to EVs in Europe and North America puts ~35% of current global palladium demand at risk in the longer term. The palladium price is predicted to weaken as autocatalyst demand slips and BEVs expand their market share.

## PRECIOUS APPRAISAL

29<sup>th</sup> August 2022

01 MARKET SPOTLIGHT

02 GOLD

03 SILVER

04 PLATINUM

05 PALLADIUM

06 **RHODIUM, RUTHENIUM, IRIDIUM**

07 TRENDS AND INVESTMENTS

08 ABOUT HERAEUS

## PRECIOUS METALS REVIEW

### Rhodium, Ruthenium, Iridium



	RHODIUM	RUTHENIUM	IRIDIUM
Reporting Week	\$15,350/oz	\$540/oz	\$4,450/oz
Previous Week	\$15,500/oz	\$545/oz	\$4,450/oz

**High-power fuel cells could provide a ruthenium demand stream from the heavy-duty sector.** Ruthenium is used as the chemical catalyst in proton exchange membrane (PEM) fuel cells. Currently, demand is small – only 5% of global demand – but it has a high potential growth rate as fuel cell vehicle accessibility spreads. Fuel cell power is more suited to heavy-duty applications than battery electric due to the large mass of batteries needed for adequate range in BEV trucks. On the other hand, fuel cell vehicles are unlikely to achieve meaningful market share in the light-vehicle segment as current generation BEVs provide superior performance and availability. Fuel cell trucks and buses are most prevalent in China, where sales are picking up, and are on track to reach a record number in 2022. Development in fuel cell technology could be a catalyst for greater adoption and boost ruthenium demand for hydrogen. The most powerful automotive fuel cells can now provide up to 500 hp, enough to match the power of an average commercial diesel engine. Toyota is undertaking research into high-output stationary applications for power generation, which provides another potential avenue for fuel cell demand.

Rhodium and ruthenium prices declined moderately last week, each by 1%. Iridium, meanwhile, remained stable for another week at \$4,450/oz.

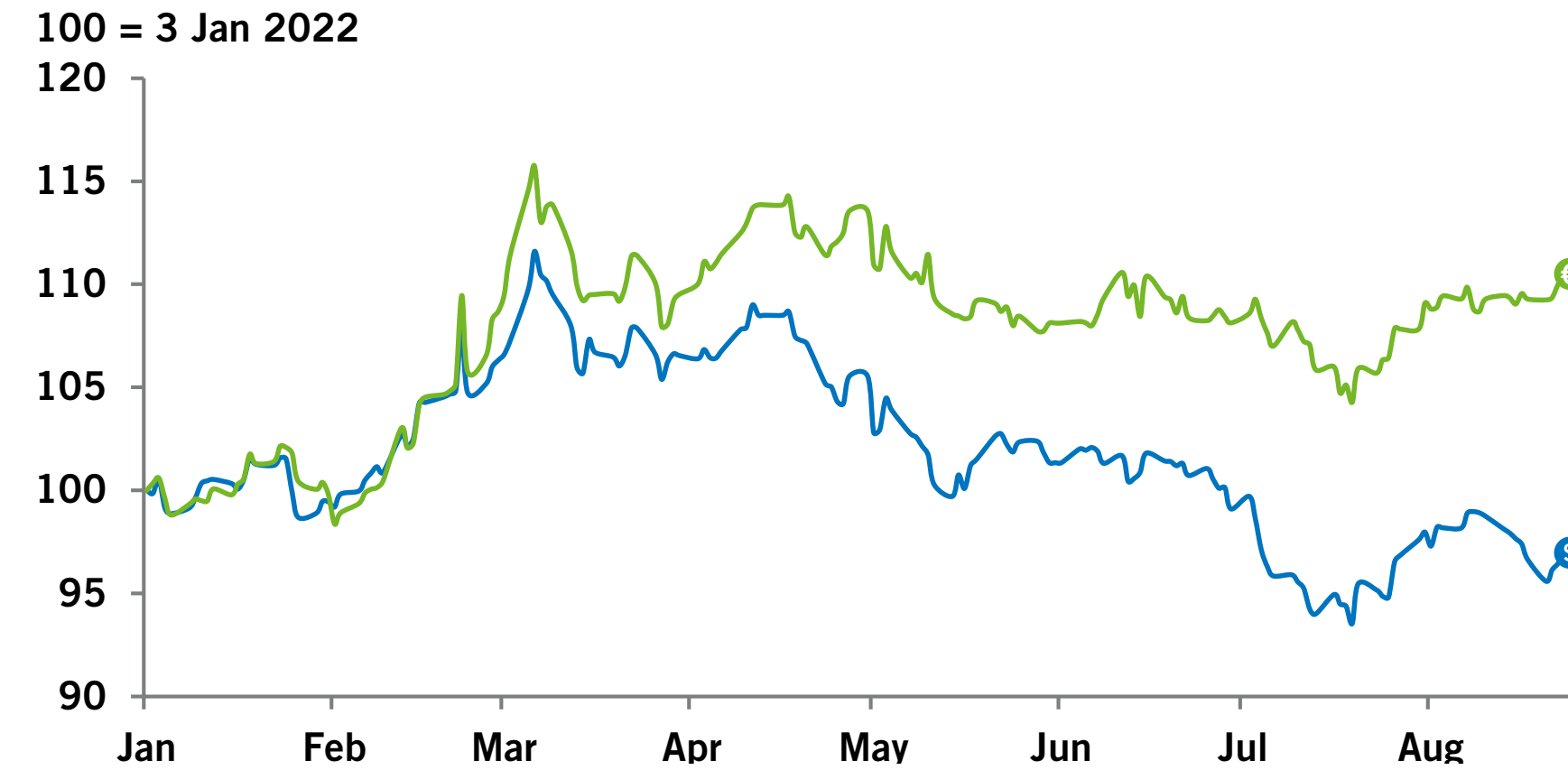
# PRECIOUS APPRAISAL

29<sup>th</sup> August 2022

- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 PLATINUM
- 05 PALLADIUM
- 06 RHODIUM, RUTHENIUM, IRIIDIUM
- 07 TRENDS AND INVESTMENTS**
- 08 ABOUT HERAEUS

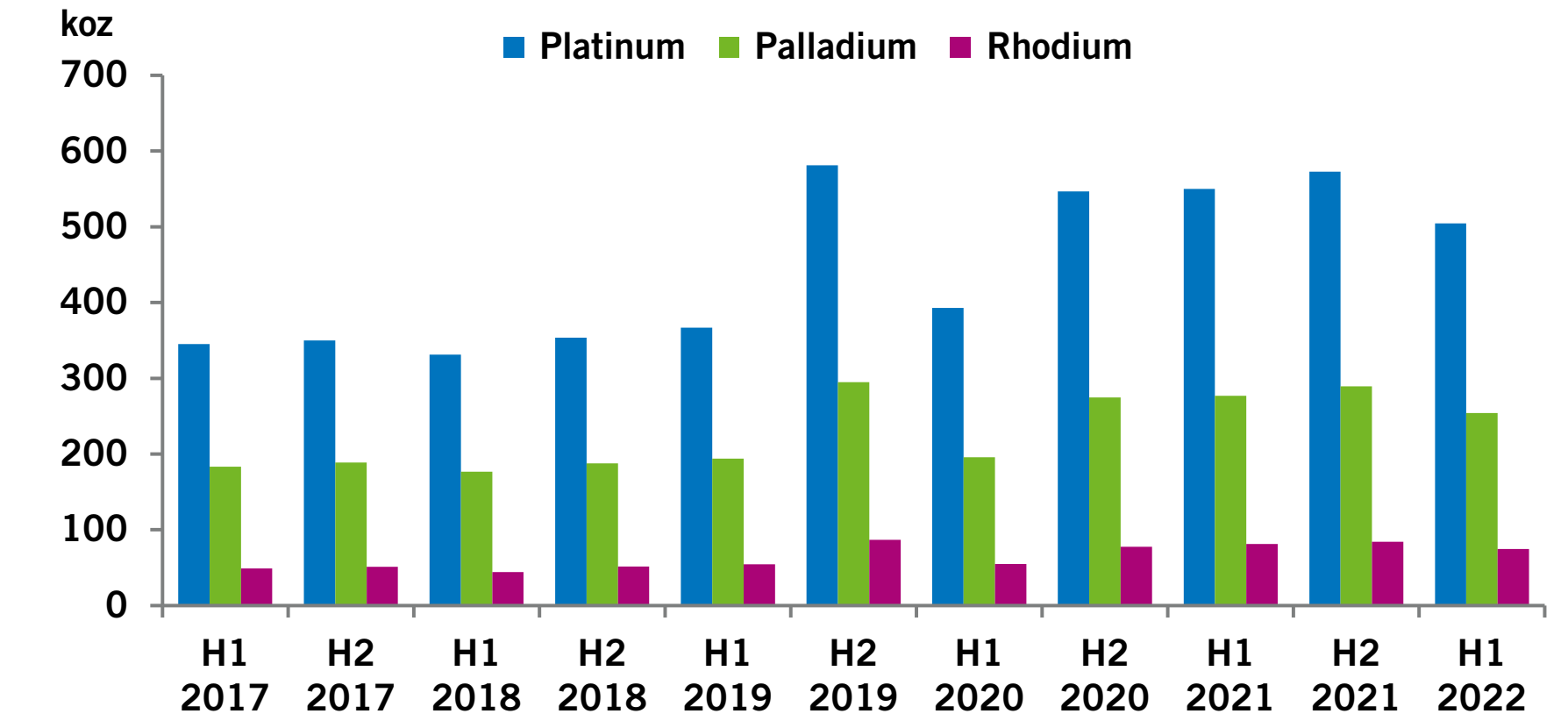
## TRENDS AND INVESTMENTS

### Gold performance - USD vs. EUR



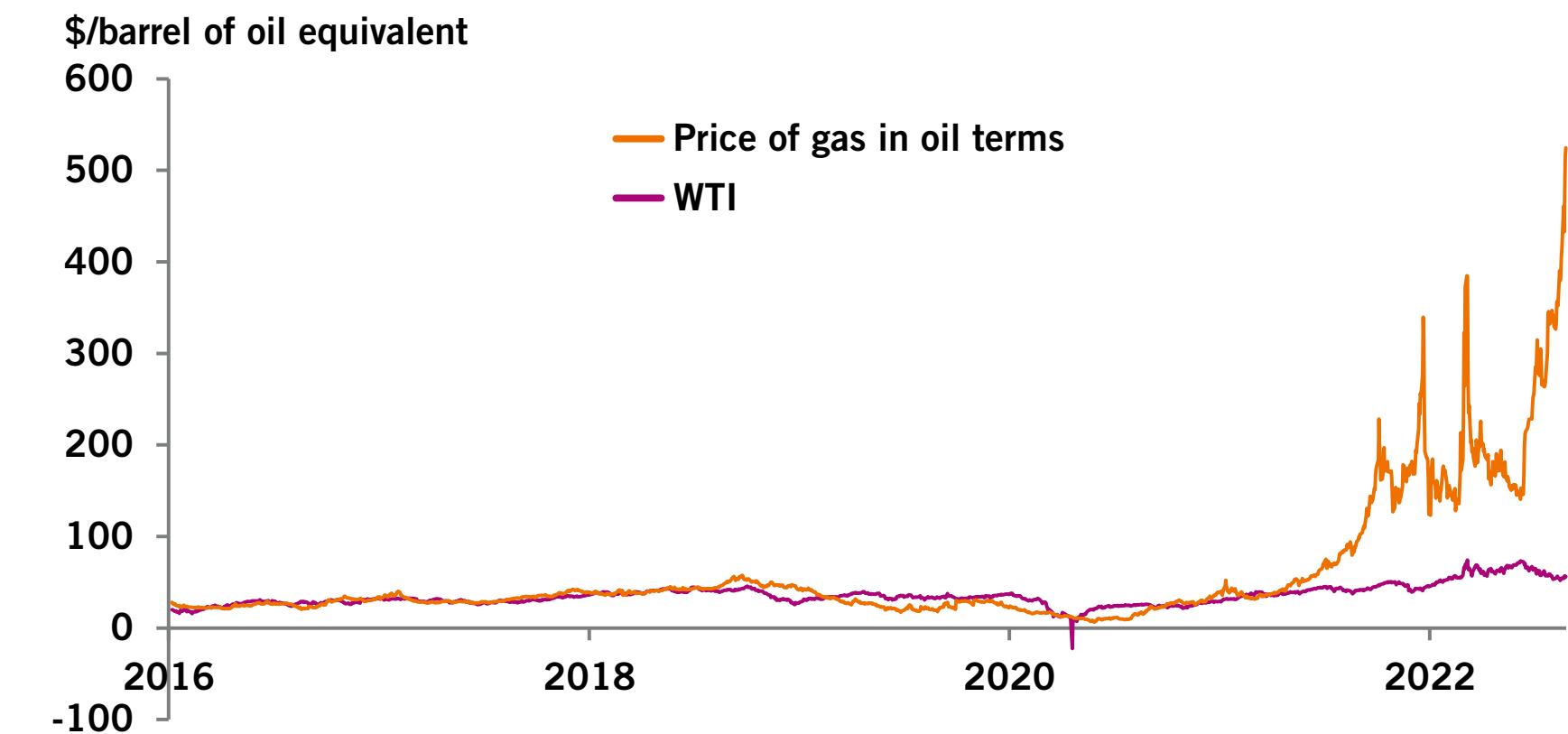
Source: SFA (Oxford), Bloomberg

### Sibanye-Stillwater South Africa PGM production



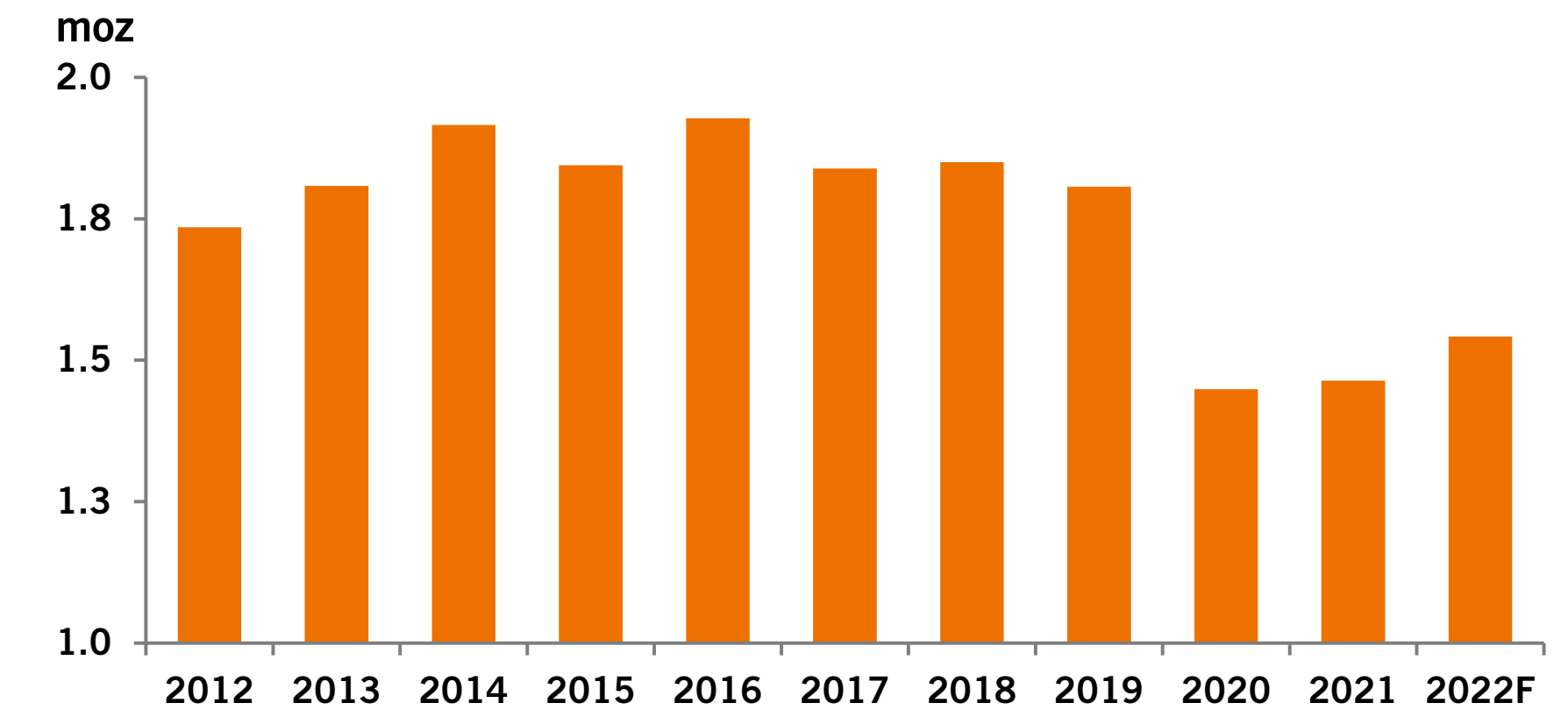
Source: SFA (Oxford), Sibanye-Stillwater

### European gas as oil equivalent



Source: SFA (Oxford), Bloomberg

### North America automotive palladium demand



Source: SFA (Oxford)



## PRECIOUS APPRAISAL

29<sup>th</sup> August 2022

- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 PLATINUM
- 05 PALLADIUM
- 06 RHODIUM, RUTHENIUM, IRIIDIUM
- 07 TRENDS AND INVESTMENTS
- 08 **ABOUT HERAEUS**

## ABOUT HERAEUS

Learn more about important trends in the precious metals markets on a weekly basis with our Heraeus Precious Appraisal. **Please subscribe: [www.herae.us/trading-market-report](http://www.herae.us/trading-market-report).**

### Heraeus Precious Metals

#### Europe, Middle East, Africa & other regions

Phone: +49 6181 35 2750

[edelmetallhandel@heraeus.com](mailto:edelmetallhandel@heraeus.com)

#### South East Asia

Phone: +852 2773 1733

[tradinghk@heraeus.com](mailto:tradinghk@heraeus.com)

#### USA

Phone: +1 212 752 2180

[tradingny@heraeus.com](mailto:tradingny@heraeus.com)

#### China

Phone: +86 21 3357 5658

[tradingsh@heraeus.com](mailto:tradingsh@heraeus.com)



Heraeus, the technology group headquartered in Hanau, Germany, is a leading international family-owned portfolio company. The company's roots go back to a family pharmacy started in 1660. Today, the Heraeus group includes businesses in the environmental, electronics, health and industrial applications sectors. Customers benefit from innovative technologies and solutions based on broad materials expertise and technological leadership.

Heraeus Precious Metals is a leading provider of precious metals services and products. We combine all activities related to our comprehensive expertise in the precious metals loop – from trading to precious metals products to recycling. We are one of the world's largest refiners of platinum group metals (PGMs) and a leading name in industrial precious metals trading.

The Heraeus Precious Appraisal is produced in collaboration with:

#### SFA (Oxford) Ltd

United Kingdom

Phone: +44 1865 784366

[www.sfa-oxford.com](http://www.sfa-oxford.com)

The Oxford Science Park,  
Oxford, United Kingdom, OX4 4GA



consulting analysts in tomorrow's commodities and technologies

### Disclaimer

This document is being supplied to the recipient only, on the basis that the recipient is reasonably believed to be a professional market participant in the precious metals market. It is directed exclusively at entrepreneurs and especially not intended for the use of consumers.

The material contained in this document has no regard to the specific investment objectives, financial situation or particular need of any specific recipient or organisation. It is not provided as part of a contractual relationship. It is not and should not be construed as an offer to sell or the solicitation of an offer to purchase or subscribe for any investment or as advice on the merits of making any investment.

This report has been compiled using information obtained from sources that Heraeus and SFA (Oxford) Ltd ("SFA") believe to be reliable but which they have not independently verified. Further, the analysis and opinions set out in this document, including any forward-looking statements, constitute a judgment as of the date of the document and are subject to change without notice.

There is no assurance that any forward-looking statements will materialize. Therefore, neither SFA nor Heraeus warrants the accuracy and completeness of the data and analysis contained in this document.

Heraeus and SFA assume no liability for any losses or damages of whatsoever kind, resulting from whatever cause, through the use of or reliance on any information contained in this document. However, in so far as a liability claim exists under German law, Heraeus and SFA shall have unlimited liability for willful or grossly negligent breach of duty.

Unless expressly permitted by law, no part of this document may be reproduced or distributed in any manner without written permission of Heraeus. Heraeus specifically prohibits the redistribution of this document, via the internet or otherwise, to non-professional or private investors and neither Heraeus nor SFA accepts any liability whatsoever for the actions of third parties in reliance on this document.