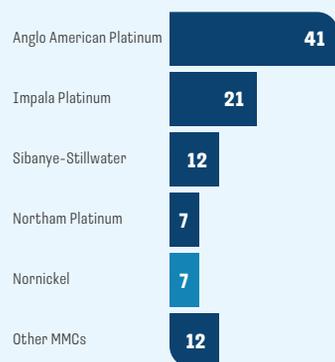


# RHODIUM (Rh)

## Nº5

in rhodium production (%)

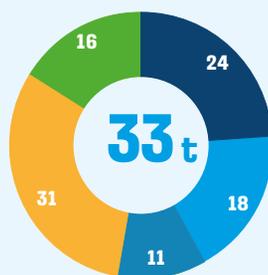


Refined metal output including production from third-party feedstock and production from own feedstock by third parties under tolling agreements

Sources: producer reports, Company analysis as of 5 March 2022

## Key trends in the rhodium market

### Rhodium consumption by region (%)



- Europe
- North America
- Japan
- China
- Other countries

Source: Company data

Despite being highly volatile, rhodium prices rose significantly over 2021, reaching a high of USD 28,000/oz in April on the back of strong demand from automakers, growing production following a period of strict pandemic restrictions and concerns over Russian supply after incidents in Norilsk. Amid growing supply from South Africa, where Anglo American Platinum started selling work-in-progress inventories accumulated in 2020, and an acute shortage of semiconductors towards the second half of 2022, price then started to fall, hitting a low of USD 9,500/oz in September and hovering around the USD 13,500/oz mark since then.



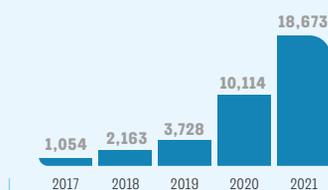
Rhodium prices in 2021 averaged at USD 18,673/oz, up 85% from the 2020 average of USD 10,114/oz.

The rhodium price averaged in 2021

**18,673 USD/oz**

+85% from the 2020

**Average annual rhodium prices (USD/oz)**



Source: Platts NY Dealers

# Market Balance

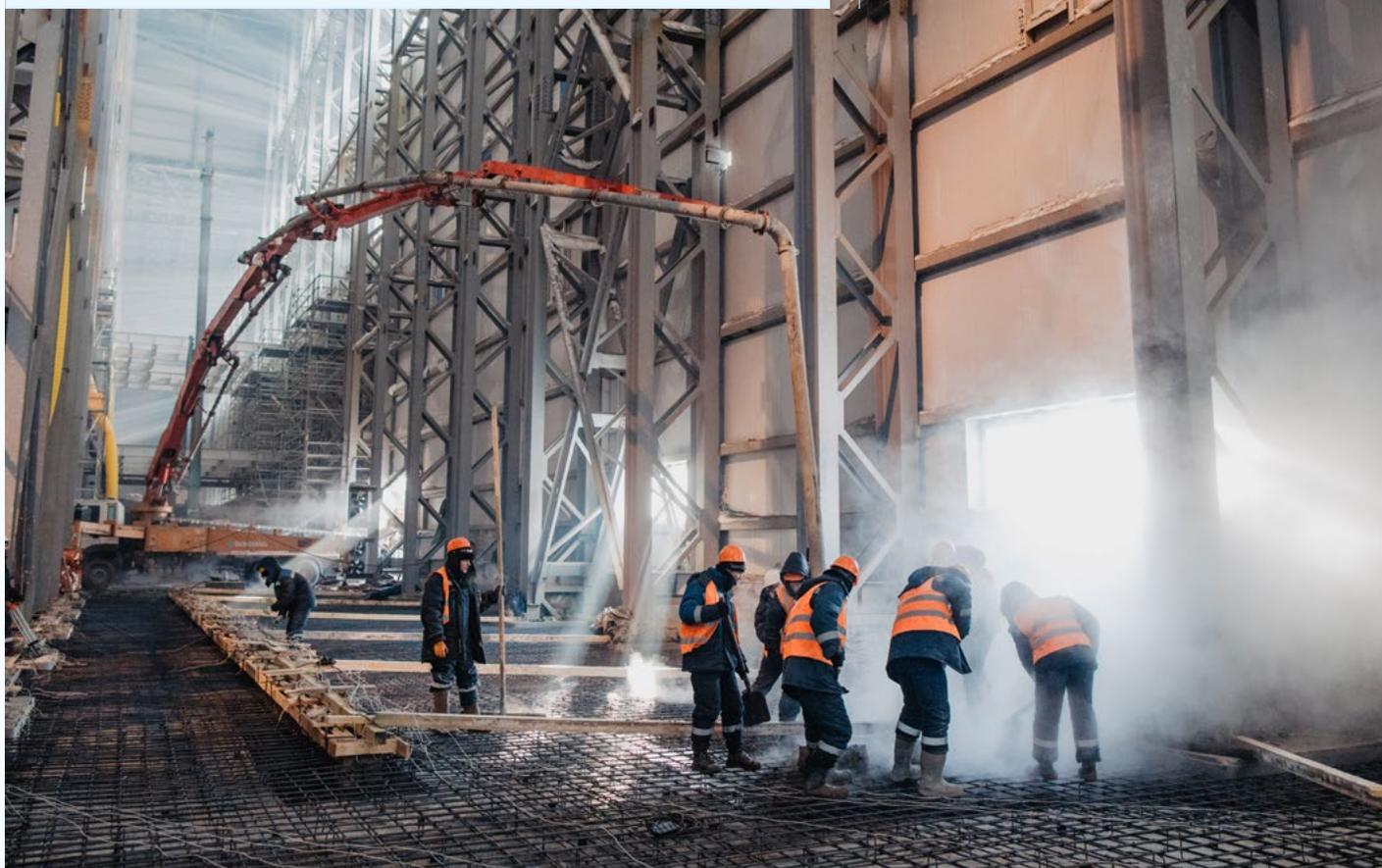
In 2021, the rhodium market moved into a surplus (5 tonnes), primarily due to a large amount of work-in-progress accumulated by Anglo American Platinum in 2020.

## Rhodium market balance in 2021

(t)

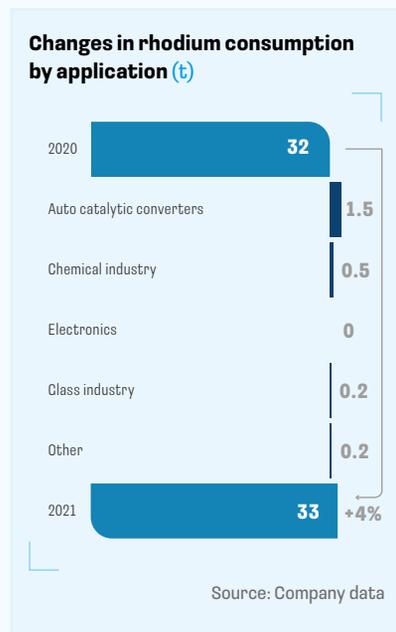
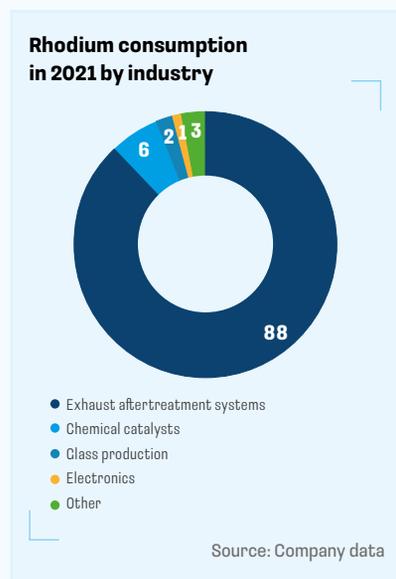
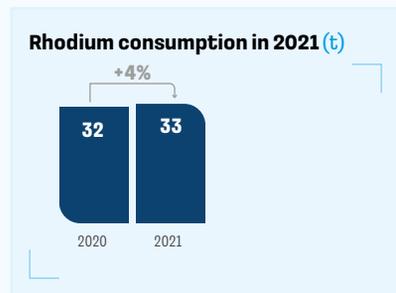
Production and consumption balance	5
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**Rhodium price in 2021 (USD/oz)**



# Consumption

Industrial consumption of rhodium increased by 1 tonne (+4%) y-o-y to 33 tonnes in 2021.



**Automotive industry.** At 85% of total consumption, the automotive industry is the key consumer of rhodium, using the metal's unique chemical properties for exhaust emission control in catalytic converters which are mandatory for road transport. Rhodium is considered the best catalyst for nitrogen oxide removal in petrol engines.

In 2021, rhodium consumption by the automotive industry grew by 1.5 tonnes (+6%) to 29 tonnes. The biggest driver of demand growth was restoration of the car market and stricter regulation of vehicle emissions, leading to higher rhodium loadings per vehicle.

Consumption of rhodium in the **chemical industry** decreased marginally due to its replacement with palladium in nitric acid catalytic gauzes.

Another sector where rhodium consumption plunged in 2021 was the **glass industry**. Rhodium is used to make bushings for glass melting. In 2021, the industry's demand for rhodium decreased marginally due to its replacement with cheaper platinum. However, due to an overall recovery in economic activity and the launch of new glass projects, the overall change in demand was insignificant.

Consumption in electronics and other industries remained almost flat.



# Production

Global production of primary refined rhodium increased by 11 tonnes y-o-y to 28 tonnes in 2021. In the reporting period, South Africa, the key rhodium producer, increased its output by 11 tonnes on the back of production recovery from a nationwide lockdown and the release of work in progress accumulated in 2020 by Anglo American Platinum. Rhodium production by the Russian Federation remained flat year-on-year despite the production incidents in Norilsk. Rhodium output in the North America and other regions also remained broadly flat.

Used exhaust gas catalysts are the main source of recycled rhodium. In 2021, secondary production declined by 0.5 tonnes to 10 tonnes due to COVID-19 restrictions and a drop in new vehicle sales which, in turn, impacted the supply of vehicles for recycling.

## Primary rhodium production (t)



Source: Company data

