

Global Palladium Market: Analysis By Supply Source (Primary Supply, and Secondary Supply), By Application (Automotive, Chemical, Dental & Biomedical, Electrical & Electronics, Investment, Jewelry, Pollution Control, and Other), By Region Size and Trends with Impact of COVID-19 and Forecast up to 2028

<https://marketpublishers.com/r/GA0F582730B8EN.html>

Date: September 2023

Pages: 147

Price: US\$ 2,250.00 (Single User License)

ID: GA0F582730B8EN

Abstracts

Palladium, represented by the symbol Pd and possessing an atomic number of 46, is a distinct silvery-white metal prized for its rarity and diverse applications. Part of the platinum group of metals, it stands out due to its exceptional ability to absorb vast amounts of hydrogen. The primary locus of palladium demand is the auto sector. Moreover, its catalytic properties make it essential in various chemical processes. The palladium demand would be constrained by growth in electric vehicles and ongoing substitution with lower-priced Platinum. And, China is the biggest consumer and importer of palladium. The global palladium market demand in 2022, was valued at 10.04 million oz.

Palladium, a silvery-white metal, has seen a surge in demand in recent years, largely attributed to its pivotal role in the production of catalytic converters for vehicles. Historically, the intrinsic characteristics of palladium, such as its durability, resistance to corrosion, and catalytic capabilities, have made it a metal of choice in the automobile sector. However, supply-side challenges, particularly stemming from geopolitical tensions and restricted production from major mining regions like South Africa and Russia, have added pressure to the market. This imbalance between demand and limited supply has precipitated significant price escalations, drawing enhanced attention to the metal's economic and environmental importance. Recycled supply has gained

importance in supplementing primary supply, having contributed almost one-third of the total supply in 2022. The global palladium market supply is likely to reach 11.02 million oz by 2028. The global Palladium market supply is projected to grow at a CAGR of 3.17% during the forecast period of 2023-2028.

Market Segmentation Analysis:

By Supply: The market report has segmented the total supply into two sources namely, primary supply and secondary supply. In 2022, the primary supply is the largest segment, which can be attributed to the direct extraction and introduction of palladium from ore deposits, predominantly from nickel-copper mines in Russia and platinum group metal mines in South Africa. Challenges such as load-shedding in South Africa, flooding in North America, and geopolitical uncertainties due to Russia's activities affected market dynamics.

Further, the secondary supply segment is expected to be the fastest-growing segment, owing to the increased recycling of end-of-life products, especially catalytic converters.. The secondary supply palladium market is further segmented, on the basis of source type, into three segments, namely, Automotive, Electrical & Electronics, and Jewelry, where the automotive is the fastest growing segment during the forecasted period of 2023-2028, as well as the largest segment in 2022.

By Demand: Based on the application, the global palladium market demand can be divided into eight segments namely, Automotive, Chemical, Electrical & Electronics, Dental & Biomedical, Pollution Control, Jewelry, Investment, and others. In 2022, the Automotive Palladium segment emerged as the dominant sector, largely due to its crucial role in reducing vehicular emissions. This surge in demand is a direct result of stringent global emission regulations like China 6a and Euro 7. Palladium, pivotal in catalytic converters of gasoline vehicles, aids in meeting these standards. However, changes loom with shifts to battery electric vehicles and platinum substitutions threatening palladium's dominance. During 2023-2028, the Chemical Palladium Market is poised for significant growth, primarily fueled by China's industrial policies that promote bulk chemical production. With the chemical sector largely unfazed by price dynamics, its demand for palladium has skyrocketed, especially with the resurgence in petrochemicals and electronics.

By Region: The palladium primary supply can be subdivided based on its origin, including regions such as Russia, South Africa, North America, Zimbabwe, and others. The Russian sector dominates the overall market supply, whereas Zimbabwe is

projected to witness the most rapid growth during the forecasted period of 2023-2028. Russia possesses the world's largest palladium reserves, primarily within the Norilsk-Talnakh ore deposits. Expansive mining operations and these vast reserves position Russia as the largest primary supplier of palladium globally. According to this report, the global palladium market demand can be divided into five segments namely, China, Europe, North America, Japan, and the Rest of the World. In 2022, China's stronghold on the global Palladium market is evident, propelled by its industrial evolution, technological prowess, and stringent emission norms. This dominance is underscored by its advancements in the electronics and automotive sectors, both mammoth consumers of palladium. As the nexus of global electronics production, countries like Japan, South Korea, and India also amplify this trend. China's strategic foresight in stockpiling, post-COVID economic strategies, and continued commitment to environmental standards forecast a sustained growth trajectory in its palladium demand.

Global Palladium Market Dynamics:

Growth Drivers: In recent years, the automotive sector has been instrumental in propelling the global palladium market's growth. The industry's mounting reliance on palladium-rich catalytic converters to meet stricter emission norms has intensified demand. With environmental regulations tightening worldwide, vehicles are increasingly equipped with these converters, harnessing palladium's unique properties to reduce harmful emissions. As a result, palladium's pivotal role in the automotive world has been solidified, underscoring its importance in addressing global environmental concerns. Further, the market is expected to grow owing to the growth of the consumer electronics industry, surge in solar PV installations, investor interest in palladium, diversified uses, market consolidation, etc. in recent years.

Challenges: The palladium market is grappling with challenges due to the rising preference for platinum in the automotive industry, especially in autocatalytic converters. Additionally, the growth of electric vehicles (EVs) poses threats to palladium's traditional role, even though hybrid vehicles still use platinum group metals (PGMs). With increasing EV adoption, particularly in areas like the US, the shift towards more cost-effective platinum amplifies the challenges for palladium. Hence, innovation and adaptability are essential for Palladium's continued relevance. Additionally, other factors like the geopolitical scenarios & supply constraints, load shedding, etc. are other challenges to the market.

Market Trends: The ascension of palladium in the R&D sector promises transformative applications across various industries. A salient example of its burgeoning potential lies

within the metallurgical sphere, where researchers fervently explore new palladium-based alloys. These alloys aim to amalgamate palladium's unique attributes with other metals, intending to create materials tailored for specific industries like aerospace and electronics. These envisioned alloys, characterized by traits such as enhanced strength or exceptional conductivity, are set to reshape industry standards. More trends in the market are believed to grow the palladium market during the forecasted period, which may include the emergence of quantum computing, advancements in Artificial Intelligence (AI) and Machine Learning (ML), advancements in sensors, Nanotechnology applications, etc.

Impact Analysis of COVID-19 and Way Forward:

The COVID-19 pandemic significantly disrupted the global palladium market. Supply chains were interrupted due to lockdowns, and a decrease in demand from the automotive sector, a primary consumer of palladium, led to imbalanced demand-supply dynamics. The semiconductor shortage, essential for vehicle production, further affected palladium consumption. Elevated palladium prices, combined with geopolitical tensions involving major producer Russia, intensified market complexities. These events highlight the need for industries to diversify sourcing, improve adaptability, and build resilient supply chains, emphasizing the significance of risk mitigation for future challenges.

Competitive Landscape and Recent Developments:

The global palladium market is predominantly controlled by a few major players, leading to a consolidated landscape where entry barriers are high due to significant capital and technological requirements. This dominance is further entrenched by their access to prime mining locations, limiting opportunities for newer, smaller entrants. The global palladium market is characterized by its adaptive and strategic nature, marked by a surge in mergers, acquisitions, and innovative collaborations. This consolidation trend, paired with increased product diversification and a dedication to research and development, indicates the market's aim to tackle challenges collaboratively. The market's dynamic approach, from pooling expertise to expanding geographically, positions it for significant growth and evolution in upcoming years.

Further, key players in the Palladium market are:

Johnson Matthey PLC

Nornickel (Norilsk Nickel)

Umicore

Glencore PLC

Vale S.A.

Anglo-American Platinum (Amplats)

Impala Platinum Holdings (Implats)

Sibanye-Stillwater

Palladium One Mining Inc.

Platinum Group Metals Ltd.

Eastern Platinum (Eastplats)

Strategic collaborations have become a hallmark of this industry. In April 2023, by acquiring onefourzero, the Palladium Group broadened its spectrum to encompass digital M&A consultancy services. Such companies not only shape the supply dynamics but also influence price trends, research, and technological advancements in the sector. Their influential positions emphasize the need for vigilance from regulatory bodies to ensure competitive practices and prevent market manipulation.

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