



Palladium sponge is a very fine powder of palladium that is primarily used as the starting material for making catalysts for chemical reactions, particularly hydrogenation reactions.

The Palladium Standard 2026

Setting the PGM agenda for the years ahead

Produced in collaboration with



THE PALLADIUM STANDARD

September 2026



The Palladium Standard

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THE PALLADIUM STANDARD

September 2026

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FOREWORD



Foreword

Much sound and fury but an uncertain outcome

The global economy is being rocked by fast-rising geopolitical friction, and unpredictable tariff policies, and the full impact may not have been felt yet. PGMs have thus far avoided tariffs and the threatened anti-dumping and countervailing duties were not applied to Russian palladium, although imports of Russian metal into the US had already stopped. The impact of tariffs last year on light- vehicle sales in the US was not as severe as feared but with another trade dispute between the US and Canada, that could change.

The conflict between the US and Iran continues to evolve, with no easy off-ramp identifiable yet. The effective closure of the Strait of Hormuz has had a significant impact on energy and other commodity exports from the Persian Gulf with a knock-on effect on their prices. Rising inflation may lead to higher interest rates which could weigh on precious metal prices. However, at this point the direct impact on the PGM markets has been modest, with auto production in Iran curtailed and sales in the Gulf region down, and minor effects on petroleum and chemical demand. China's weak domestic auto sales have been a larger drag on light-vehicle production and palladium demand so far this year.

Supply security of critical minerals is becoming ever more important for governments. Domestic recycling avoids the need to look elsewhere for critical minerals. The feature article by Ben Davis of Davis Recycling discusses the urban orebody with its rich and varied selection of metals, including PGMs, how the industry has evolved as technology has improved, and the impact of prices on recycling volumes. However, mining precedes recycling and recycling cannot replace delayed mined ounces.

THE PGM MARKETS IN 2026



The PGM markets in 2026

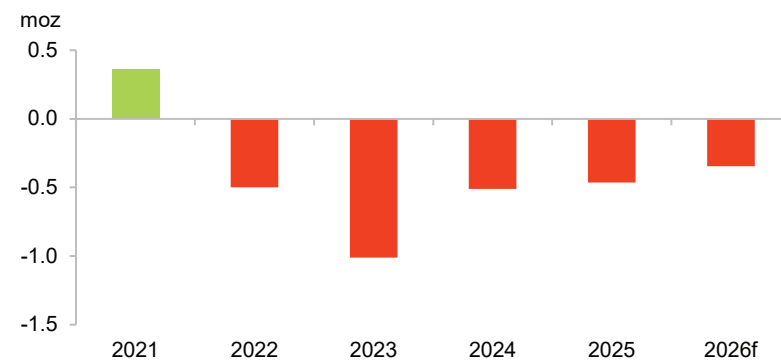
Dr. Ralph Grimble, SFA (Oxford)

The palladium market

The palladium market is forecast to have a 345 koz deficit in 2026, only modestly smaller than last year, as a result of net demand falling slightly more than supply. Palladium demand is once again impacted by the reduction in ICE and hybrid light-vehicle production as BEVs increase market share. Primary supply is set to decline by 4% owing to a 10% drop in Russia, as Nor Nickel processes lower-grade material, and North American production contracts marginally. Secondary supply is predicted to increase this year as the higher palladium price in the first quarter boosted scrap material volumes.

Both supply and demand are falling, reducing the size of the palladium market

Palladium market balance



Source: SFA (Oxford)

US policy decisions continue to have an outsized influence on the global economy. The conflict with Iran resulted in the closure of the Strait of Hormuz which cut off exports of oil, natural gas and a variety of other commodities and chemical products. The resulting jump in fuel prices has encouraged more people to look at BEVs, which continue to gain market share from ICE and hybrid vehicles in most markets. The global light-vehicle production forecast has been downgraded as a result of the war in the Middle East impacting sales and production in the region, and also owing to the Chinese domestic market significantly underperforming expectations. Global light-vehicle production is now expected to drop by around 1 million units this year rather than expanding by 2 million units as was predicted at the start of the year.

US policy is influencing PGM demand

Mine supply

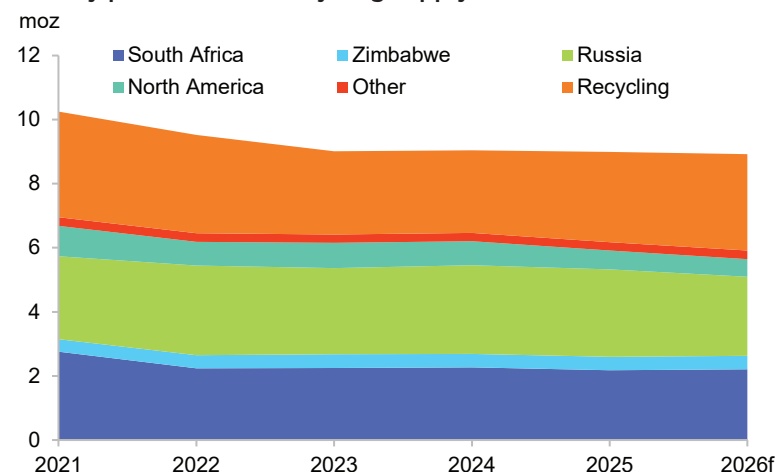
Primary palladium supply is estimated to drop by 4% to 5.91 moz this year, owing to a modest decline in North America, and more significantly due to temporarily lower guided volumes from Russia.

In North America, production from Stillwater has stabilised following its restructuring, but may be at risk if the strike, which impacts the Stillwater East mine and Columbus metallurgical complex but not yet the East Boulder mine, is prolonged. Meanwhile, output from Impala Canada is shrinking this year as the mine was being managed for closure in 2027, and a decline is still expected this year despite the latest life extension.

South African output is forecast to rise slightly as production declines in some areas are more than offset by growth from some existing operations and the ramp-up of Eland and Ivanplats' Platreef project. In Russia, Nor Nickel is processing lower-grade ore and has reduced its guidance to 2.42-2.47 moz, for a roughly 10% year-on-year drop in output. In Zimbabwe and other regions, supply is expected to be little changed from last year.

Russian production is temporarily lower this year

Primary palladium and recycling supply



Source: SFA (Oxford)

Recycling

Secondary palladium supply is predicted to rise by 7% to 3.01 moz, with growth expected in most regions. Rising PGM prices in the second half of 2025 helped to encourage scrap material flows, including some dishoarding of stockpiled autocatalysts, and the momentum continued into the first quarter of 2026, resulting in rising volumes of spent autocatalysts reaching recyclers. The pullback in PGM prices has been followed by an easing in material flows in the second quarter. However, robust scrap steel prices and high aluminium prices continue to provide an incentive to collect and process end-of-life vehicles. With car sales in China underperforming expectations, the growth in recycling there may be lower than anticipated.

Higher prices have lifted secondary supply

Demand

Global palladium demand is forecast to slip by 2% to 9.27 moz this year as automotive demand contracts, outweighing a slight gain in industrial demand. BEVs continue to gain market share, and the war in the Middle East and disappointing domestic auto sales in China mean that the forecast for global light-vehicle production this year has been revised down to a drop of about 1 million units to 92 million.

Palladium demand is contracting

Automotive demand

Automotive demand for palladium is projected to fall by 3% to 7.19 moz in 2026. With the overall light-vehicle production shrinking and BEVs gaining further market share, the number of catalysed light vehicles produced this year is estimated to fall by more than 3 million units to 75 million, while BEV production increases by 2 million units to almost 17 million. In the first half of the year, light-vehicle sales in China were almost 2 million lower than in the first half of 2025. Weak sales in their domestic market have led Chinese manufacturers to expand their exports to Europe and the Rest of the World. However, overall automotive palladium demand in China is predicted to contract this year. In the US, the removal of tax credits means that BEVs are not gaining market share and, as a result, catalysed light-vehicle production in North America is expected to support a similar level of palladium demand to last year.

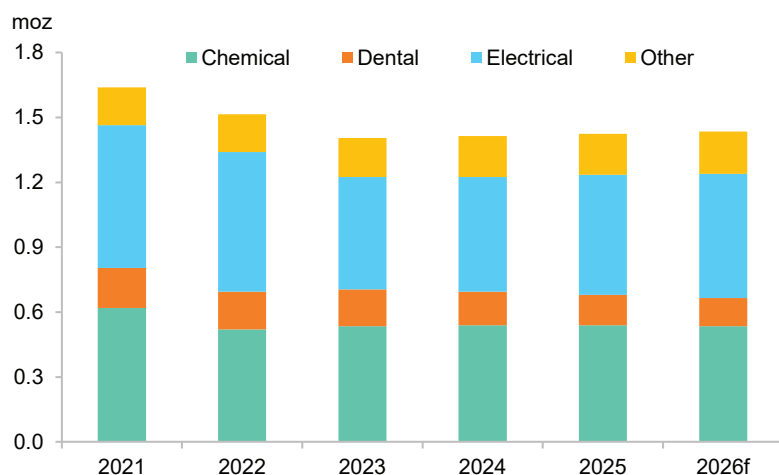
ICE and hybrid sales are falling, cutting automotive demand

Industrial demand

Industrial requirements for palladium are forecast to be marginally higher this year at 1.41 moz. The very high gold price has resulted in some substitution to palladium in some plating applications, resulting in higher electronic demand. This more than offsets the ongoing decline in dental usage and a slight decrease in chemical demand.

Industrial requirements are edging up

Palladium industrial demand



Source: SFA (Oxford)

Investment

Palladium ETF holdings have trended in the same direction as the palladium price in 2026. Global ETF holdings rose by 63 koz in January, taking total holdings to over 1.2 moz as the price continued to rally. However, once the price began to decline, profit-taking followed and ETF holdings shrank by 172 koz in February and March. Further, more modest net sales followed until August when the price rallied and investors added 53 koz to their ETF holdings taking the total to just over 1.0 moz. The majority of the changes in holdings this year have occurred in US-listed ETFs. The non-commercial net position in palladium futures on NYMEX was net short for several years until the price rally in the second half of 2025 finally forced a change to net long in December. However, with the price declining from its peak at the end of January, the non-commercial traders reverted to being net short by almost 500 koz at the end of August. Nevertheless, palladium held in NYMEX vaults has increased by 40 koz to 250 koz in the first eight months of the year.

ETF holdings are down slightly so far this year

The platinum market

The platinum market is forecast to have a deficit of 240 koz (excl. investment) in 2026 as demand shrinks more than supply. Platinum demand is predicted to contract in the automotive, jewellery and industrial sectors this year. Global production is expected to decrease as output in South Africa dips and Russian production is constrained by processing lower-grade ore.

The platinum market is in deficit

Global primary supply is predicted to fall by 1% to 5.26 moz. South African production is projected to dip by 1% to 3.80 moz. Nor Nickel is temporarily processing lower-grade ore this year which is expected to result in 4% lower platinum production from Russia. North American output is likely to be stable in 2026 following the restructuring at Stillwater, although there is a risk that output could be impacted if the strike is not resolved quickly. Supply from Zimbabwe is projected to drop slightly this year, while output in other regions is flat.

Primary supply is predicted to fall to 5.3 moz...

Secondary platinum supply is estimated to be little changed at 1.49 moz, as an improvement in autocatalyst recycling is offset by a decline in jewellery recycling.

...while secondary supply is flat

Automotive demand is forecast to drop by 6% to 3.03 moz this year. Over the last few years, automotive platinum demand has been supported by the shift to tri-metal gasoline catalysts for light vehicles. However, with the platinum price now trading at a premium to palladium that trend is being reversed, with more palladium being used at the expense of platinum. This, combined with the reduction in ICE and hybrid light-vehicle production this year, is driving the contraction in automotive demand.

This year, platinum jewellery demand is predicted to fall by 12% to 1.36 moz. In 2025, platinum jewellery demand was supported by restocking in China as fabricators took advantage of the low price in the first few months of the year. However, despite the historically large discount to the gold price, platinum jewellery sales to consumers were not as strong as the fabricators had hoped and a return to more modest demand is anticipated for this year.

Platinum jewellery demand is predicted to shrink

Platinum requirements in industrial end-uses are projected to decline by 8% to 2.30 moz this year. The transition to heat-assisted magnetic recording technology in hard disk drives is supporting higher electrical demand for platinum because the disks contain more platinum than in the currently dominant perpendicular magnetic recording technology. Medical demand is expected to be slightly higher this year. However, requirements in the chemical, glass and petroleum sectors are expected to shrink, resulting in an overall decline in industrial demand. Glass demand is forecast to be relatively robust this year but usage is dropping back from a very strong year in 2025.

Industrial demand is declining on lower glass requirements

The rhodium market

The rhodium market is forecast to have a deficit of 10 koz in 2026. Automotive demand is moving lower as BEVs continue to take market share from ICE and hybrid light vehicles, whereas industrial demand is edging up. Total supply is predicted to be slightly higher owing to a rise in recycling, as primary supply is expected to be flat.

*The rhodium market
is in deficit this year*

Automotive rhodium demand is estimated to decline by 5% to 875 koz. The war in the Middle East has resulted in higher fuel prices which has given further impetus to the transition to BEVs and hit auto production in the region. In addition, vehicle sales in the Chinese market have underperformed expectations this year, resulting in lower ICE and hybrid light-vehicle production globally.

*Automotive demand
is falling*

Industrial rhodium requirements are projected to climb by 3% to 160 koz owing to slightly higher demand in the chemical and other demand sectors, while both glass and electrical usage remain stable.

Primary rhodium supply is forecast to hold steady at 700 koz this year. South African output is projected to edge up slightly to 565 koz. Production in Zimbabwe, Russia, North America and other regions is predicted to be little changed. Secondary rhodium supply is expected to increase this year as autocatalyst recycling is supported by higher PGM prices.

*Primary supply is
steady*

The price outlook for the next six months

Palladium: \$1,455/oz

The palladium market remains in deficit this year, with both primary supply and net demand shrinking by around 6%. Without a temporary drop of 260 koz in Russian production, the market would be much nearer balance. The palladium price has fallen back below \$1,500/oz, and liquidity has improved as ETFs have seen net sales so far this year and lease rates are back at a more typical low level.

Falling demand is not conducive to strong price performance and automotive demand continues to shrink. Reverse substitution back to palladium in gasoline autocatalysts is outweighed by declining ICE and hybrid light-vehicle production. This year, BEV market share gains have been compounded by contracting light-vehicle production as a result of the conflict in the Middle East and weak Chinese domestic demand. There is downside price risk if high energy and commodity prices as a result of curtailed exports from the Gulf cause an economic slowdown.

Price seasonality is favourable over the next six months, although the fundamentals appear less so, and the price is forecast to trade between \$1,600/oz and \$1,100/oz and average \$1,455/oz.

Platinum: \$1,860/oz

The platinum price reached a record high in January but has retreated significantly since then. Market liquidity has improved, with lease rates at much lower levels, as the build-up of stocks that occurred in 2025 in NYMEX vaults and ETF holdings has been largely reversed.

The platinum market is estimated as being in deficit in 2026 (excluding investment), although the demand pull is easing as net demand is shrinking more than primary supply. Economic risks appear to be tilted to the downside and that suggests that the price risks are also to the downside unless there is a resumption of the gold price rally and platinum follows gold higher.

The platinum price is predicted to trade in a range between \$2,175/oz and \$1,450/oz and average \$1,860/oz over the next six months.

Rhodium: \$9,265/oz

Rhodium demand is declining as BEVs are gaining market share while overall light-vehicle production is falling. A reduction in primary supply is being offset by higher recycling. As a result, although the market is in deficit, the deficit is shrinking. A recovery in automotive demand looks unlikely in the near term and economic conditions could deteriorate further if the war in the Middle East keeps energy prices elevated.

The rhodium price is expected to trade between \$12,000/oz and \$7,000/oz, averaging \$9,265/oz over the next six months.

A TALE OF TWO MINERS



A tale of two miners

Ben Davis, Davis Recycling Inc., Johnson City, Tennessee

Introduction

Consider two miners who both set out, today, to bring new platinum-group metal ounces to market.

The first is a mining company. Ahead of it sits exploration, a feasibility study, permitting, financing, shaft sinking and plant construction. If everything goes right, first production is ten to fifteen years away and the bill runs into the billions. The orebody it is chasing might carry a few grams of PGM per tonne of rock, a mile or more underground. It takes patient capital, world-class engineering, and nerve to commit billions today for ounces that arrive in the 2040s. This industry exists because miners keep making that commitment.

Primary mining takes decades and billions to deliver

The second miner started this morning with a pickup truck, a smartphone and an app we built over years chasing the urban orebody. This is the story of how technology opened a trade to anyone, and why this trade still depends entirely on the first miner.

The urban orebody was not laid down by geology but by legislation

When the Clean Air Act put a catalytic converter on every new American car from 1975, and as emissions standards tightened worldwide, carmakers began loading the vehicle fleet with platinum, palladium and rhodium. Loadings per vehicle rose nearly nine-fold between 1990 and 2017 as standards ratcheted up. Fifty years of that built the richest orebody in America, parked in every driveway. But every gram of it came out of the ground first. Urban mining creates nothing. It recovers what primary miners have already won, mostly from reefs a mile deep in South Africa, which still holds over 80 per cent of the world's platinum reserves and 90 per cent of its rhodium.

Legislation created the urban orebody

Recycling still depends on primary mine supply

And the converter is only part of the deposit. A modern vehicle carries PGMs in its exhaust, chromium and nickel & steel, copper in its wiring harness, aluminium in its body, and silver & gold neodymium magnets in its electronics. Nearly every one of those sits on the 2025 US List of Critical Minerals. The American vehicle fleet is a rolling national stockpile of critical minerals, and it exists only because miners filled it, one mined tonne at a time.

A rolling stockpile of critical minerals

Where the 2025 US Critical Minerals List rides in a modern vehicle

Exhaust / catalytic converter	Platinum	Palladium	Rhodium
Steel & alloys	Chromium	Nickel	
Wiring harness	Copper		
Body & wheels	Aluminium		
Electronics & motors	Silver	Gold*	Neodymium

Gold chips = on the 2025 US Critical Minerals List (60 minerals; every PGM included).
*Gold: recoverable value, not listed.

Source: Davis Recycling Inc.

Modern vehicles are rolling stockpiles of critical minerals

The information revolution in the recycling sector

When I started in this business 28 years ago, scrapping was a profession that few knew existed. It ran on accumulated personal knowledge. You graded converters by eye, bought on averages, and the man with three decades of experience beat the man with three years every time.

Information has democratised the recycling trade

That barrier has collapsed. Today, a first-year buyer stands in a scrapyards with a phone that identifies a converter by serial number, tells them what that converter is worth and prices it against live metal markets. XRF analysers read a sample in seconds. Hedging tools that were once the preserve of trading desks sit in the same app that prices the part. Anyone can now become an urban platinum miner, a rhodium miner, a gold or silver miner, and many thousands have. We are taking material that was originally mined in another country, going into our own cities and re-mining it. At that point we are not in the converter business. We are in the precious metal business.

Smartphones now put trading-desk tools in scrapyards

CatApp by Davis Recycling Inc.

Current Inventory:

9 pieces (\$229 avg.)

Last Added:

22667030 (4@\$318 Whole)



2022 RAM 1500 BIG HORN/
LONE STAR

Vin:

1C6RREBM*NN*****

Curb Weight:

5608 lbs

Engine:

3.0L CAST-IRON (390 lbs)

Transmission:

ALUMINUM (150 lbs)

Wheels:

16-875 - ALUMINUM (76 lbs)

Battery:

LEAD (35 lbs)



7795

2022 RAM 1500 BIG
HORN/LONE STAR

917AB | 3.0L

\$0

x1

5608 lbs



8327

2022 RAM 1500
BIG HORN/LONE
STAR

240 | 3.0L

\$528

x1

5608 lbs

Back To Search

Converters

Inventory

Transactions

Settings

9

Apps turn every vehicle into a priced mineral inventory

Source: Davis Recycling Inc.

The result is a collection network of remarkable depth and speed. When rhodium neared \$30,000 an ounce in 2021, the whole stream responded within days, including, regrettably, the theft wave, because nothing responds to price like the urban mine. Theft follows value faster than it ever follows the law, which is why the legitimate trade holds hard to verified sourcing. The lesson for supply modellers is the same one: this stream reacts to price in days, not years. It switches rather than ramps, and it switches in two pools. When prices fall, both pools hold: some yards sit on processed material rather than book what they feel is a loss, and individuals let cars with converters pile up rather than accept a low offer.

Urban supply responds to price in days, not years

When prices recover, the yard pool can move all at once, because the material is already collected, boxed and ready to ship. The individual pool lags a little behind, then accelerates as word of the better market spreads.

Yard inventories can return to market almost instantly

A system that keeps getting tighter

Twenty-eight years ago, this system leaked everywhere. Converters went through shredders still bolted to the car. Complete vehicles rusted away with their metal aboard because nobody nearby knew what a converter was worth. Then came the first real metal spike of 2001, just as the Internet spread. People could search and find more buyers; where once a regional buyer controlled their own territory and not everyone had access to buyers in other states, price transparency closed most of those leaks. When every yard, every tow operator and every farmer with a dead truck can look up what price a part brings, very little gets shredded or buried by accident anymore. Identification by serial number means the right price gets paid for the right part, sampling and assay methods have tightened at every stage, and refiner recoveries on platinum and palladium now run in the high 90 per cents. Ounce for ounce, more of what the carmakers installed comes back today than at any point in the fifty years of this trade.

Digital transparency has closed historical recycling leakages

Better recovery keeps more PGMs in circulation

Estimated annual loss of platinum and iridium from US recycling

Oxygen sensors

An estimated 30,000-80,000 troy ounces of platinum are contained in oxygen sensors sold or installed annually in the United States.

Assuming approximately 70% is recycled:

- Platinum recycled: 21,000-56,000 oz
- Platinum lost due to non-collection: 9,000-24,000 oz

Platinum and iridium spark plugs

Because there is currently very little organised collection of used spark plugs, the estimated annual metal loss is:

- Iridium lost: 7,000-15,000 oz
- Platinum lost: 25,000-50,000 oz
- Combined spark-plug loss: 32,000-65,000 oz

Small components still lose tens of thousands of ounces

Combined estimated annual metal loss

Combining uncollected oxygen sensors and spark plugs:

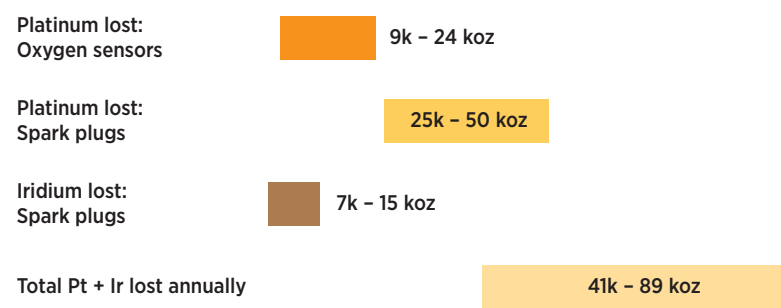
- Platinum lost: 34,000-74,000 oz
- Iridium lost: 7,000-15,000 oz
- Platinum and iridium lost: 41,000-89,000 ounces annually

Based on these estimates, the United States may be losing approximately 41,000-89,000 troy ounces of platinum and iridium every year because oxygen sensors and precious-metal spark plugs are not being fully collected and recycled.

Uncollected sensors and spark plugs lose 41-89 koz annually

The uncollected urban mine: Sensors and spark plugs

Estimated annual US metal loss from non-collection, troy ounces



Most remaining losses are structural, not operational

Source: Davis Recycling Inc. Note. DRI estimates; oxygen sensor recovery assumed ~70%, spark plug collection minimal.

The losses that remain are structural, not sloppy. The biggest leak for the US is the used vehicle export market: cars sail away and those ounces are gone for decades, if not for good, from the US market. Second is the long tail of vehicles that sit in fields and barns, slow to return. And the theft wave pulled forward an amount of OEM loaded converters. What is left after that is small change: washcoat dust lost in careless cutting and the odd damaged unit tossed by an untrained hand.

Used-vehicle exports are the biggest unrecoverable leak

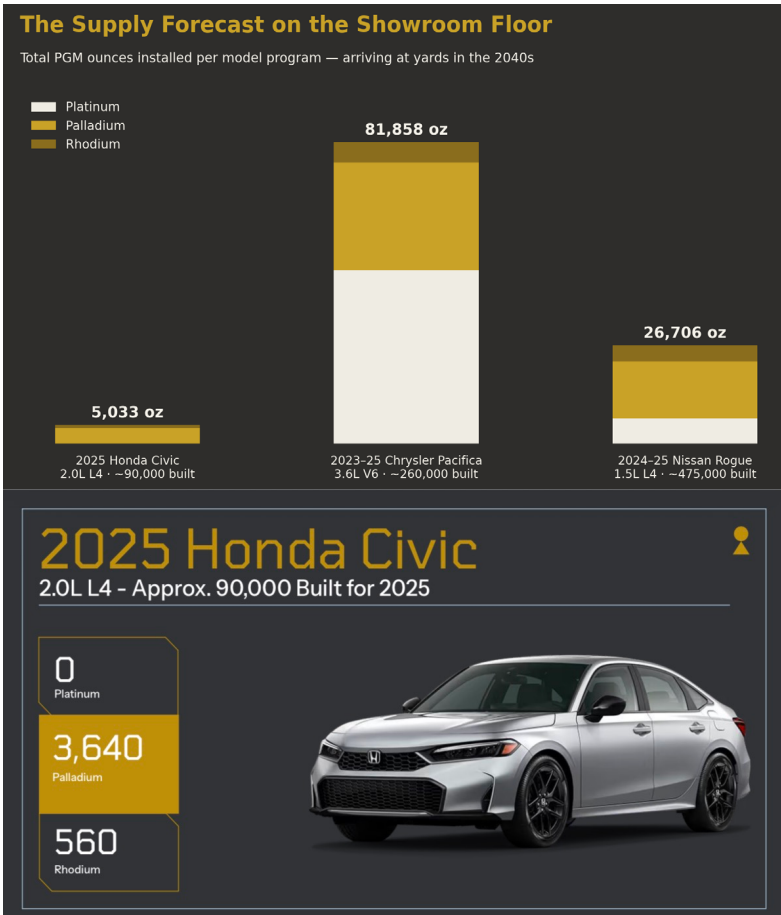
The economics of the chain are more robust than outsiders assume, and for a simple reason: every layer can protect itself. Collector, aggregator, processor, refiner, each stage can hedge on liquid metal markets, and metal in inventory does not spoil, so a holder can wait out a bad market rather than sell into it. Capital in this trade is mostly working capital, not sunk plant, so capacity flexes with price instead of going bankrupt. The levers of profitability are well understood: accurate identification, sampling and assay integrity, refining terms, freight, and the cost of money on inventory. The value in this material is invisible to the eye, so trust is measured in grams, and the operators who manage those levers well survive every cycle. When prices fall, margins compress and the marginal collector parks their truck, but the system does not break. It waits.

Metal inventory can wait out weak markets

Why efficiency cannot replace the mine

Here is the part of the tale that this audience already knows, and the part I want to say plainly to a room of miners: no amount of recycling efficiency changes the arithmetic. My reserves are simply yesterday's primary production, delivered on a fifteen-to-twenty-year delay. At Platinum Week 2025 in New York, I presented new car models as the supply forecast, because the loadings carmakers install today are the ounces I recover in the 2040s. If primary ounces stop going in, recovered ounces stop coming out. There is no version of urban mining, however efficient, that feeds a growing demand base on its own.

Recycling cannot replace delayed primary mine supply



Source: Davis Recycling Inc.

Today's vehicle loadings are tomorrow's recycled supply

The 2040s' recycling pool is being built today

The United States is living proof of what happens when a country steps back from mining. The 2025 US List of Critical Minerals now runs to 60 minerals. Every platinum-group metal is on it. So are chromium, nickel, copper and silver. US Geological Survey reporting shows the US is 100 per cent import-reliant for a dozen listed minerals and more than 50 per cent reliant for dozens more. That is what a critical minerals crisis looks like, and it was built by decades of underinvestment in exactly the long-lead, capital-heavy work primary miners do. Any mineral we stop mining ends up on that list eventually. Mining is a critical part of a long future, full stop.

Critical-mineral dependence reflects decades of mining underinvestment

Two miners, one market

So, this is not a tale of the new miner replacing the old. It is a tale of a relay. The primary miner runs the hard leg: a decade or more of patient capital before the first ounces. The urban miner runs the return leg: recovering those same ounces at a fraction of the energy, emissions and lead time, and handing them back to industry. Every ounce we recover above ground stretches the value of an ounce someone risked billions to lift from below it. Technology has made my leg of the relay faster, more transparent and open to anyone with a smartphone and a truck. Nothing has changed the fact that the baton starts underground.

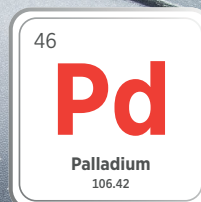
The urban mining we do is a critical part of a more circular future. But recycling has to be profitable or it does not happen, and it has to be fed or it cannot happen. Keep the mines investing and the economics working, and between the two miners this industry can supply the future for as long as anyone can see.

Primary and urban miners are two legs of one relay

The future depends on both types of miners working together

A comprehensive update on the current state of the autocatalyst recycling industry

September report available now!



An assessment of the PGM autocatalyst recycling market

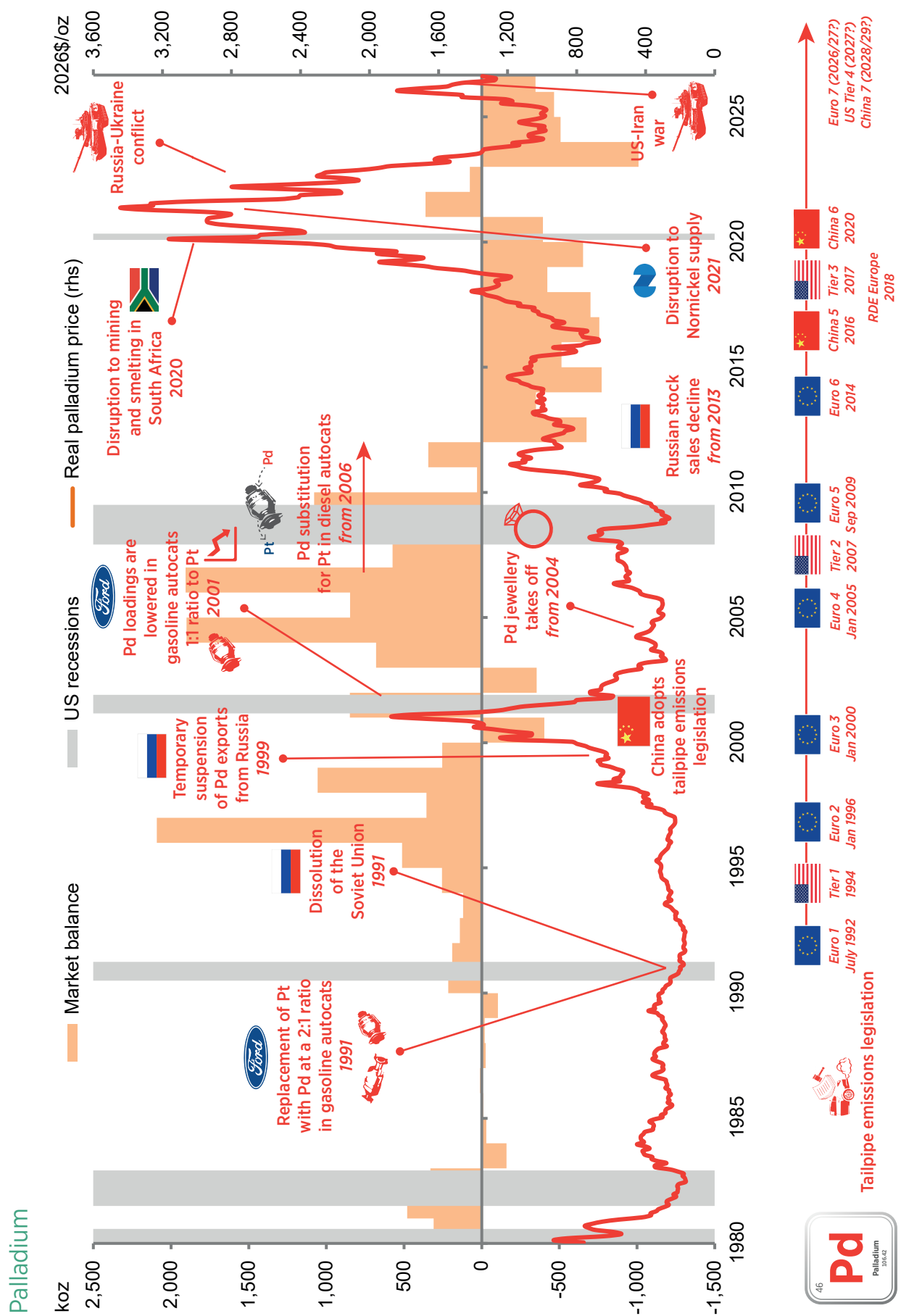
**The most in-depth evaluation of autocatalyst recycling available to
2040, providing insight into:**

- Emissions legislation and the implications for recycled PGM volumes in the future
- Recycled autocatalyst volumes by region with projections out to 2040
- Volumes by vehicle type and contained PGMs
- The impact of metal price volatility on autocatalyst recycling
- China's PGM recycling market including current policy and regulations

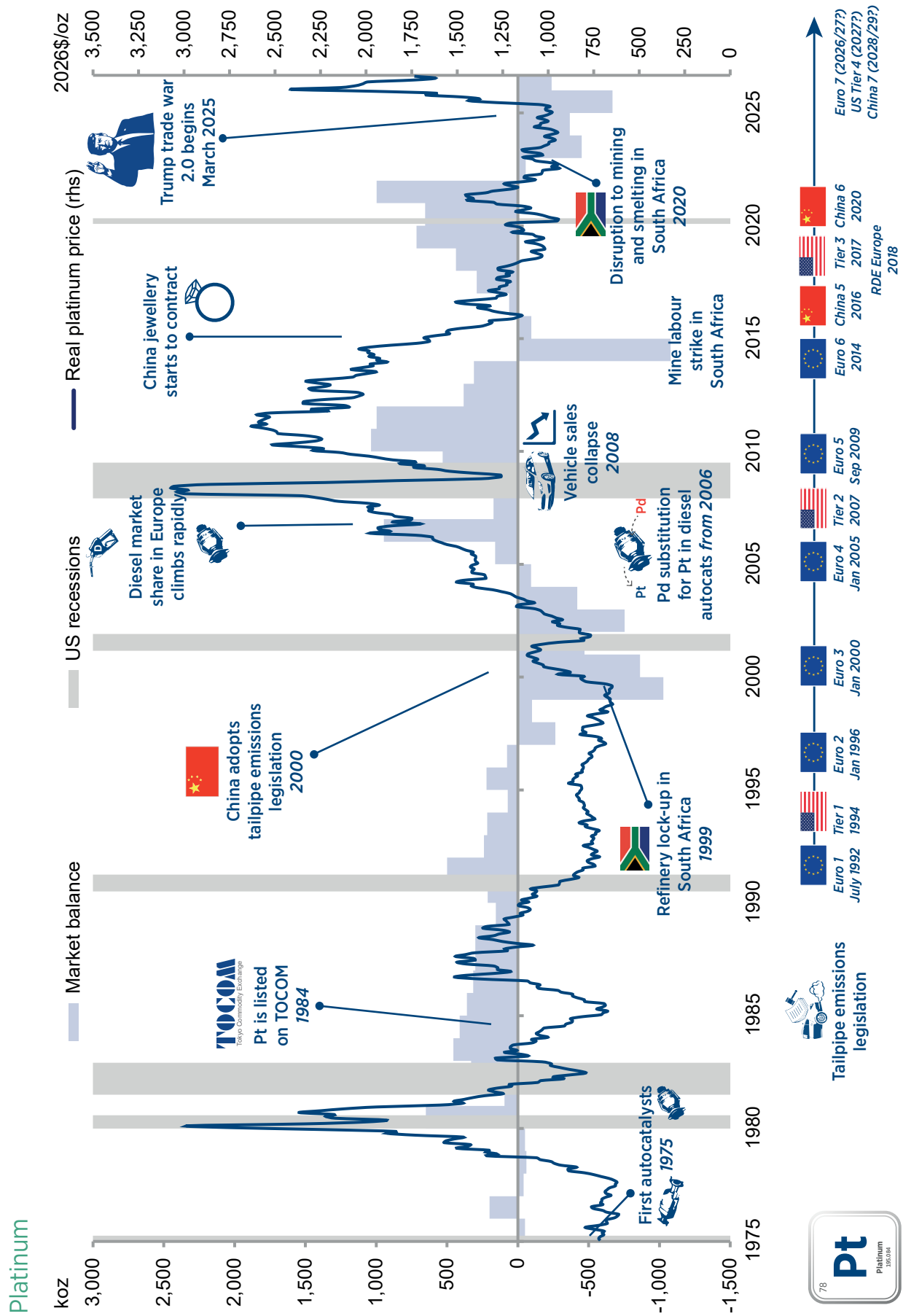
Unrivalled insights and analysis

PGM PRICE HISTORY



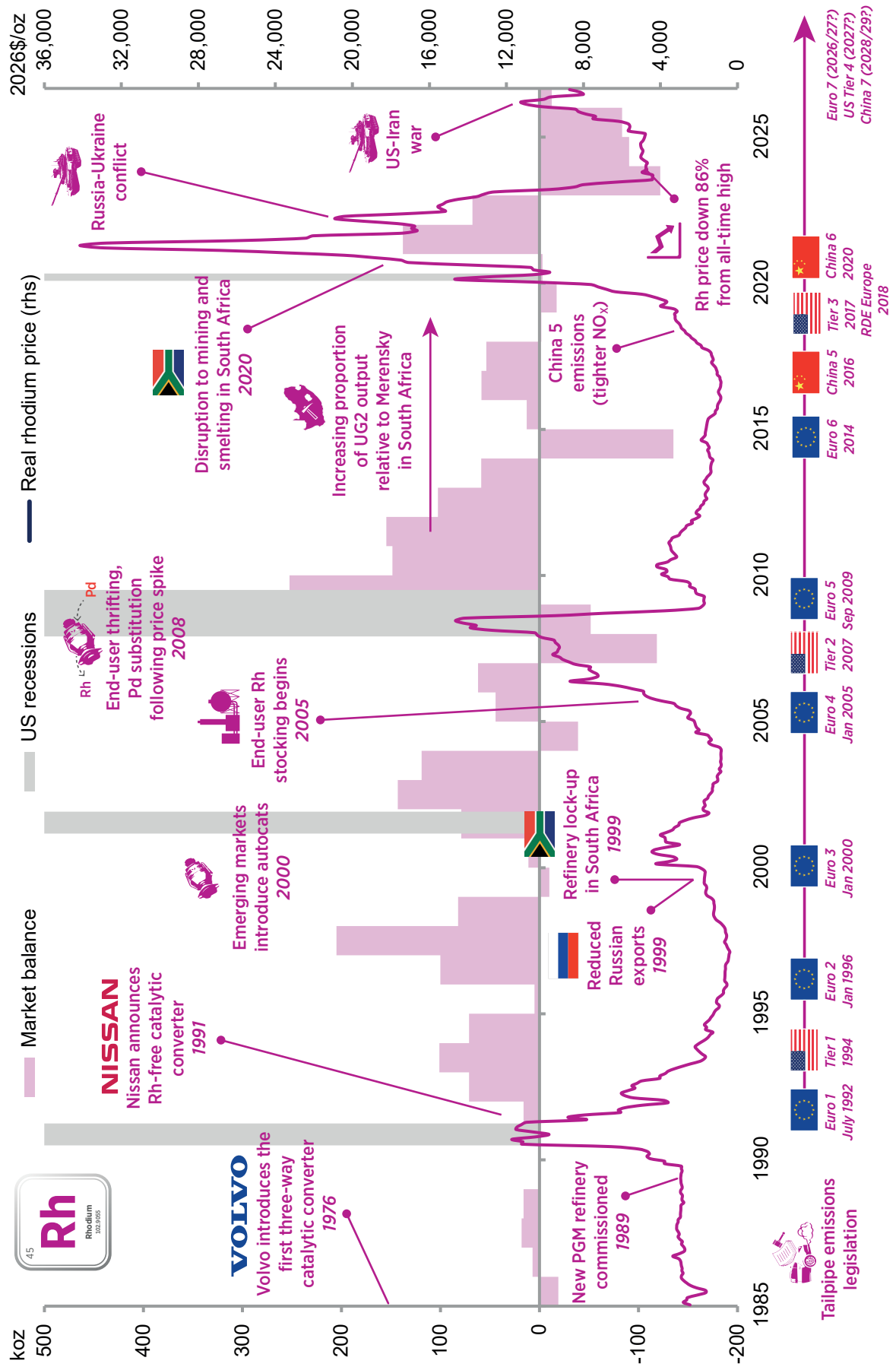


Source: SFA (Oxford), Bloomberg



Source: SFA (Oxford), Bloomberg

Rhodium



Source: SFA (Oxford), Bloomberg

APPENDIX



Palladium supply-demand balance

koz	2018	2019	2020	2021	2022	2023	2024	2025	2026f
Primary supply									
Regional									
South Africa	2,500	2,555	1,845	2,755	2,240	2,245	2,270	2,175	2,205
Russia	2,670	2,870	2,810	2,585	2,790	2,690	2,760	2,725	2,465
Zimbabwe	380	385	405	395	410	430	420	420	420
North America	1,035	975	950	950	740	785	755	590	555
Other	390	375	375	265	265	260	255	260	265
Total	6,975	7,160	6,385	6,955	6,450	6,415	6,460	6,170	5,910
Demand & recycling									
Autocatalyst									
Gross demand	8,340	8,875	7,750	8,095	8,365	8,480	8,015	7,890	7,695
Recycling	2,410	2,565	2,395	2,840	2,670	2,215	2,210	2,430	2,680
Net demand	5,935	6,310	5,355	5,255	5,695	6,265	5,805	5,465	5,010
Jewellery									
Gross demand	220	210	195	155	140	130	125	140	130
Recycling	60	55	50	40	35	30	30	40	30
Net demand	155	155	145	115	105	100	95	100	100
Industrial demand	1,840	1,715	1,640	1,620	1,490	1,380	1,385	1,395	1,410
Hydrogen	0	0	10	20	20	25	30	30	30
Other recycling	370	365	335	415	365	350	345	350	295
Gross demand	10,400	10,805	9,590	9,885	10,020	10,020	9,555	9,455	9,265
Recycling	2,845	2,990	2,780	3,295	3,070	2,595	2,585	2,820	3,010
Net demand	7,555	7,820	6,815	6,595	6,950	7,425	6,970	6,635	6,255
Market balance									
Balance (before ETFs)	-580	-655	-425	360	-500	-1,010	-510	-470	-345
ETFs (stock allocation)	-565	-85	-115	40	-90	75	240	370	
Balance after ETFs	-15	-570	-310	325	-410	-1,085	-750	-835	-345

Source: SFA (Oxford)



Palladium demand and recycling summary

koz	2018	2019	2020	2021	2022	2023	2024	2025	2026f
Gross demand									
Autocatalyst									
North America	1,860	1,815	1,460	1,620	1,670	1,805	1,805	1,775	1,785
Western Europe	1,730	1,960	1,490	1,465	1,635	1,765	1,590	1,440	1,380
Japan	840	870	760	720	715	735	665	680	655
China	1,940	2,290	2,460	2,135	1,825	1,610	1,370	1,415	1,305
India	320	285	235	335	410	410	425	450	485
RoW	1,655	1,650	1,345	1,820	2,110	2,155	2,165	2,135	2,090
Total	8,340	8,875	7,750	8,095	8,365	8,480	8,015	7,890	7,695
Jewellery									
North America	35	35	35	30	25	25	25	25	25
Western Europe	55	55	50	40	35	35	30	40	35
Japan	50	50	45	35	30	30	30	30	30
China	55	50	45	35	35	30	30	30	30
RoW	25	25	20	15	15	15	15	15	15
Total	220	210	195	155	140	130	125	140	130
Industrial									
North America	305	295	245	250	245	225	230	215	210
Western Europe	295	290	260	260	250	235	235	225	225
Japan	335	300	255	245	235	205	200	200	190
China	485	415	485	510	420	380	380	395	425
RoW	420	415	395	350	340	335	335	355	360
Total	1,840	1,715	1,640	1,620	1,490	1,380	1,385	1,395	1,410
Hydrogen	0	0	10	20	20	25	30	30	30
Total gross demand									
North America	2,200	2,150	1,740	1,900	1,940	2,055	2,055	2,015	2,020
Western Europe	2,075	2,305	1,800	1,770	1,920	2,035	1,855	1,705	1,640
Japan	1,225	1,220	1,055	1,000	985	965	895	910	870
China	2,480	2,760	2,990	2,685	2,280	2,020	1,780	1,840	1,755
RoW	2,420	2,375	1,995	2,520	2,880	2,915	2,935	2,955	2,945
Total	10,400	10,805	9,590	9,885	10,020	10,020	9,555	9,455	9,265
Recycling									
Autocatalyst									
North America	1,360	1,430	1,370	1,580	1,355	1,085	1,065	1,170	1,310
Western Europe	475	480	445	550	505	390	380	395	430
Japan	180	200	190	215	210	220	210	210	205
China	155	165	150	180	245	185	220	270	315
RoW	240	290	240	315	350	335	340	380	415
Total	2,410	2,565	2,395	2,840	2,670	2,215	2,210	2,430	2,680
Jewellery									
Japan	15	15	15	10	10	5	5	10	5
China	45	40	35	30	25	25	25	30	25
Total	60	55	50	40	35	30	30	40	30
WEEE									
North America	70	70	60	70	60	55	55	55	45
Western Europe	80	75	70	75	70	65	60	60	50
Japan	125	120	110	120	110	100	100	95	80
China	40	45	45	60	55	60	60	65	60
RoW	60	60	55	90	70	70	65	70	55
Hydrogen	0	0	0	0	0	0	0	0	5
Total recycling									
North America	1,430	1,495	1,435	1,645	1,420	1,145	1,120	1,225	1,355
Western Europe	550	555	510	625	575	455	440	455	480
Japan	320	340	310	350	330	330	320	315	295
China	240	250	230	270	325	265	305	370	400
RoW	295	345	295	405	425	400	405	445	475
Total	2,845	2,990	2,780	3,295	3,070	2,595	2,585	2,820	3,010



Platinum supply-demand balance

koz	2018	2019	2020	2021	2022	2023	2024	2025	2026f
Primary supply									
Regional									
South Africa	4,470	4,405	3,260	4,715	3,975	3,920	3,955	3,825	3,795
Russia	665	710	700	640	655	670	675	675	645
Zimbabwe	465	460	480	470	490	520	505	510	505
North America	345	350	330	265	250	270	250	205	200
Other	180	160	165	125	120	110	105	110	110
Total	6,130	6,085	4,940	6,220	5,485	5,490	5,485	5,320	5,255
Demand & recycling									
Autocatalyst									
Gross demand	3,130	3,010	2,550	2,865	3,185	3,610	3,480	3,395	3,215
Recycling	1,420	1,495	1,310	1,425	1,280	1,080	1,070	1,125	1,185
Net demand	1,710	1,515	1,240	1,445	1,900	2,530	2,415	2,270	2,030
Jewellery									
Gross demand	2,245	2,090	1,560	1,780	1,485	1,390	1,380	1,540	1,360
Recycling	505	500	410	400	250	245	250	310	250
Net demand	1,740	1,595	1,150	1,380	1,235	1,145	1,130	1,230	1,110
Industrial demand	2,200	2,245	1,915	2,425	2,425	2,270	2,285	2,490	2,300
Hydrogen	70	40	15	20	25	45	80	55	105
Other recycling	30	30	35	45	40	45	55	55	45
Gross demand	7,645	7,390	6,040	7,090	7,115	7,315	7,230	7,480	6,980
Recycling	1,955	2,025	1,755	1,870	1,575	1,370	1,380	1,490	1,485
Net demand	5,690	5,365	4,285	5,220	5,545	5,940	5,855	5,990	5,495
Market balance									
Balance (before ETFs)	435	715	655	995	-55	-450	-365	-670	-240
ETFs (stock allocation)	-240	995	505	-265	-560	-80	265	65	
Balance after ETFs	680	-280	150	1,265	505	-370	-630	-735	-240

Source: SFA (Oxford)



Platinum demand and recycling summary

koz	2018	2019	2020	2021	2022	2023	2024	2025	2026f
Gross demand									
Autocatalyst									
North America	390	375	285	395	535	605	640	605	605
Western Europe	1,355	1,290	990	885	940	1,050	915	845	780
Japan	425	395	300	280	275	305	300	305	290
China	220	275	465	565	530	580	560	595	540
India	200	160	115	175	225	225	225	235	245
RoW	545	515	400	560	680	845	845	805	755
Total	3,130	3,010	2,550	2,865	3,185	3,610	3,480	3,395	3,215

Source: SFA (Oxford)

Platinum demand and recycling summary (continued)

koz	2018	2019	2020	2021	2022	2023	2024	2025	2026f
Gross demand									
Jewellery									
North America	280	275	210	255	265	250	260	250	235
Western Europe	255	260	175	190	225	220	230	280	245
Japan	345	330	245	260	270	255	260	245	230
China	1,095	945	755	875	510	435	390	520	395
India	195	210	120	135	160	165	175	180	185
RoW	75	75	55	60	60	65	65	65	70
Total	2,245	2,090	1,560	1,780	1,485	1,390	1,380	1,540	1,360
Industrial									
North America	435	350	295	380	405	455	460	355	405
Western Europe	345	315	300	50	300	295	305	295	270
Japan	125	125	160	160	115	100	95	110	100
China	700	820	660	1,105	935	755	800	1,070	860
RoW	600	640	500	725	670	670	625	655	660
Total	2,200	2,245	1,915	2,425	2,425	2,270	2,285	2,490	2,300
Hydrogen	70	40	15	20	25	45	80	55	105
Total gross demand									
North America	1,100	1,000	790	1,035	1,200	1,310	1,360	1,215	1,245
Western Europe	1,955	1,865	1,460	1,130	1,465	1,565	1,450	1,420	1,295
Japan	890	850	710	705	665	660	655	660	620
China	2,015	2,035	1,880	2,545	1,970	1,765	1,750	2,185	1,795
RoW	1,615	1,600	1,190	1,660	1,795	1,970	1,935	1,940	1,915
Total	7,645	7,390	6,040	7,090	7,115	7,315	7,230	7,480	6,980
Recycling									
Autocatalyst									
North America	640	640	560	570	475	370	365	375	380
Western Europe	465	515	445	520	465	385	375	395	430
Japan	110	110	105	115	105	110	105	110	110
China	35	40	30	35	40	30	35	40	45
RoW	170	190	170	185	190	185	190	210	220
Total	1,420	1,495	1,310	1,425	1,280	1,080	1,070	1,125	1,185
Jewellery									
North America	5	5	5	5	5	5	5	5	5
Western Europe	5	5	5	5	5	5	5	5	5
Japan	145	140	110	115	105	105	115	130	110
China	340	340	285	265	125	120	115	160	120
RoW	5	10	10	10	10	10	10	10	10
Total	505	500	410	400	250	245	250	310	250
WEEE	30	30	35	45	40	45	55	55	45
Hydrogen	0	0	0	0	0	0	0	0	5
Total recycling									
North America	650	650	575	585	490	385	380	390	395
Western Europe	480	530	460	535	485	400	395	410	445
Japan	260	255	215	235	215	220	225	240	225
China	380	385	320	305	170	160	160	210	175
RoW	185	205	190	210	215	210	215	240	245
Total	1,955	2,025	1,755	1,870	1,575	1,370	1,380	1,490	1,485

Source: SFA (Oxford)



Rhodium supply-demand balance

koz	2018	2019	2020	2021	2022	2023	2024	2025	2026f
Primary supply									
Regional									
South Africa	625	640	475	670	595	570	570	560	565
Russia	75	80	80	75	75	75	75	75	75
Zimbabwe	40	40	45	40	45	45	45	45	45
North America	20	20	20	20	15	20	15	15	15
Other	10	10	10	5	5	5	5	5	5
Total	770	790	630	815	735	715	715	700	700
Demand & recycling									
Autocatalyst									
Gross demand	910	1,055	955	955	975	985	935	925	875
Recycling	335	350	325	360	325	275	270	295	320
Net demand	570	705	630	595	650	710	665	630	555
Industrial demand	205	105	5	85	20	130	145	155	160
Other recycling	2	2	2	3	3	2	3	3	2
Gross demand	1,110	1,160	960	1,040	995	1,115	1,080	1,080	1,035
Recycling	340	355	330	360	330	275	275	300	320
Net demand	775	810	630	675	665	840	805	785	715
Market balance									
Balance (before ETFs)	0	-15	-5	140	70	-120	-90	-85	-10
ETFs (stock allocation)	-50	-15	-10	-5	0	0	0	10	
Balance after ETFs	45	-5	5	140	70	-125	-90	-95	-10

Source: SFA (Oxford)



Rhodium demand and recycling summary

koz	2018	2019	2020	2021	2022	2023	2024	2025	2026f
Gross demand									
Autocatalyst									
North America	225	220	175	190	205	210	210	210	205
Western Europe	230	320	245	240	255	280	255	235	215
Japan	130	130	110	100	100	105	95	100	95
China	150	205	275	235	195	160	135	145	130
India	25	25	20	25	35	30	35	35	35
RoW	150	155	125	160	185	200	205	205	195
Total	910	1,055	955	955	975	985	935	925	875
Industrial									
North America	35	30	-15	0	25	30	30	30	35
Western Europe	20	15	-20	10	10	15	15	15	15
Japan	10	10	10	10	10	10	10	10	10
China	105	30	10	45	-50	45	65	75	70
RoW	30	20	25	25	25	30	30	30	35
Total	205	105	5	85	20	130	145	155	160
Total gross demand									
North America	265	250	160	190	230	240	240	240	235
Western Europe	250	335	225	250	265	290	270	245	225
Japan	140	140	120	110	110	115	110	110	105
China	255	240	285	280	145	205	195	215	205
RoW	205	200	170	210	245	265	270	270	265
Total	1,110	1,160	960	1,040	995	1,115	1,080	1,080	1,035
Recycling									
Autocatalyst									
North America	180	185	175	190	165	130	130	145	160
Western Europe	60	65	60	70	65	50	50	50	60
Japan	45	45	40	45	40	40	40	40	35
China	5	5	5	10	15	10	15	15	20
RoW	45	50	45	45	45	45	45	45	45
Total	335	350	325	360	325	275	270	295	320

Source: SFA (Oxford)



METHODOLOGY

Primary supply is calculated from actual mine production and excludes the sale of stock in order to provide pure production data. Stock sales are treated separately in SFA's database as movement of stocks. Therefore, state stock sales from Russia are excluded in tabulations.

Gross demand is a measure of intensity of use.

Net demand is a measure of the theoretical requirement for new metal, i.e. net of recycling.

Automotive demand is based on vehicle production data not sales.

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