

November 2024

Nedbank Hydrogen and Fuel Cell Roundtable



Demand and Hydrogen / Fuel Cell Opportunities

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Introduction to Mitsubishi Corporation

Mitsubishi RtM offers a broad range of trading services in **Precious Metals** designed to add value and create international business opportunities **utilizing over 40 years of experience** in Precious metals business.

Through its extensive relationships across a wide range of industries, Mitsubishi RtM provides clients with a **“Value Chain” of precious metals services**: from raw metal supply and secondary recycling to the provision of credit and financial risk management.

Mitsubishi RtM offers a range of risk management products which can be customized to develop strategies that best suit our clients' requirements:

- **Global coverage** of **Au, Ag, Pt, Pd, Rh, Ru & Ir** markets;
- **Spot, average and forward Pricing with global logistics**;
- **Leases and consignments**;
- Futures, options, financially settled swaps, location swaps;
- Financial commodity products for Investment (Index Linked Notes, ETFs).

RtM



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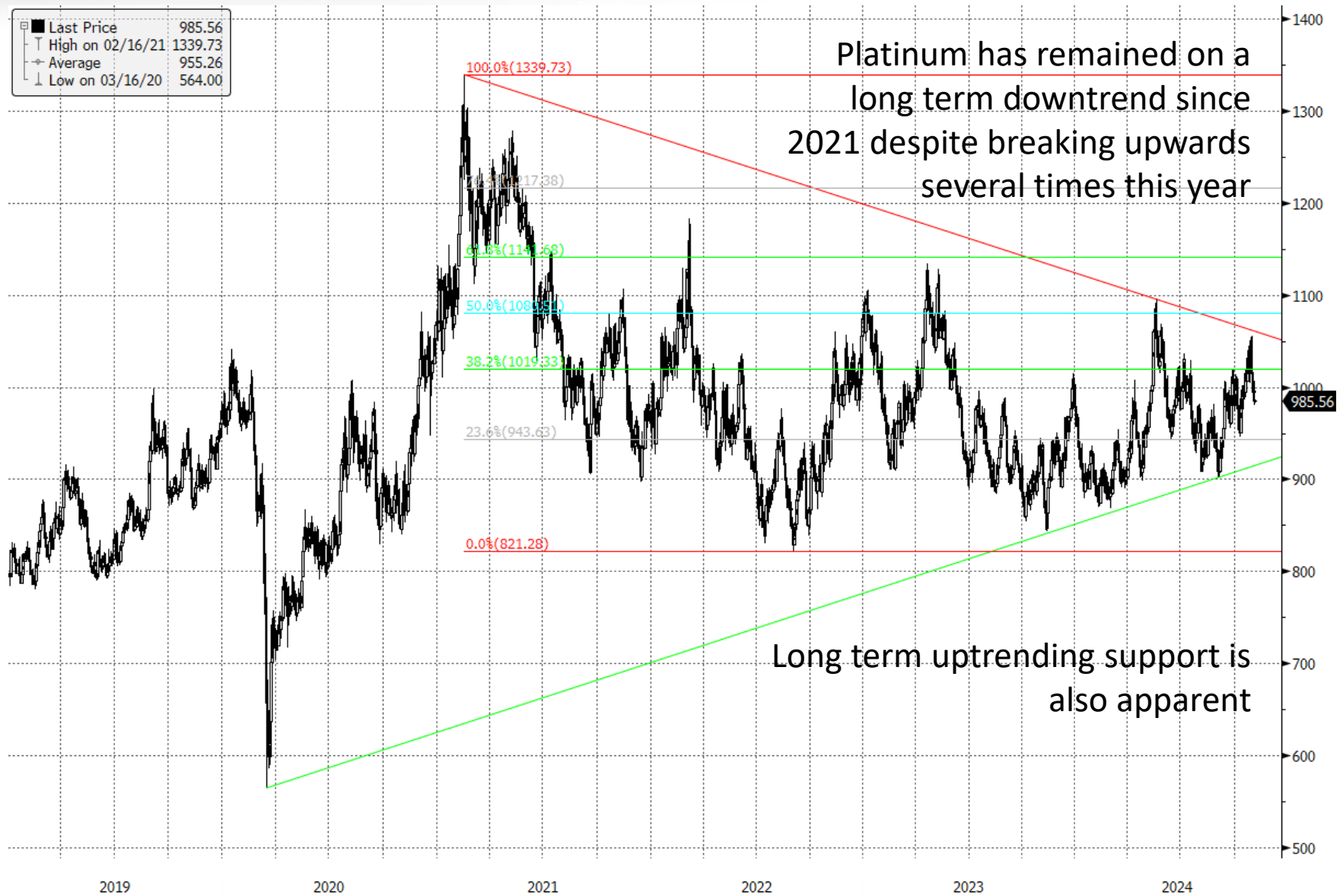
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A different disclaimer: the jury's still out?



Platinum prices: medium term trends

Platinum (US\$/toz)



Source: Mitsubishi from Bloomberg Professional Service

Palladium prices: medium term trends

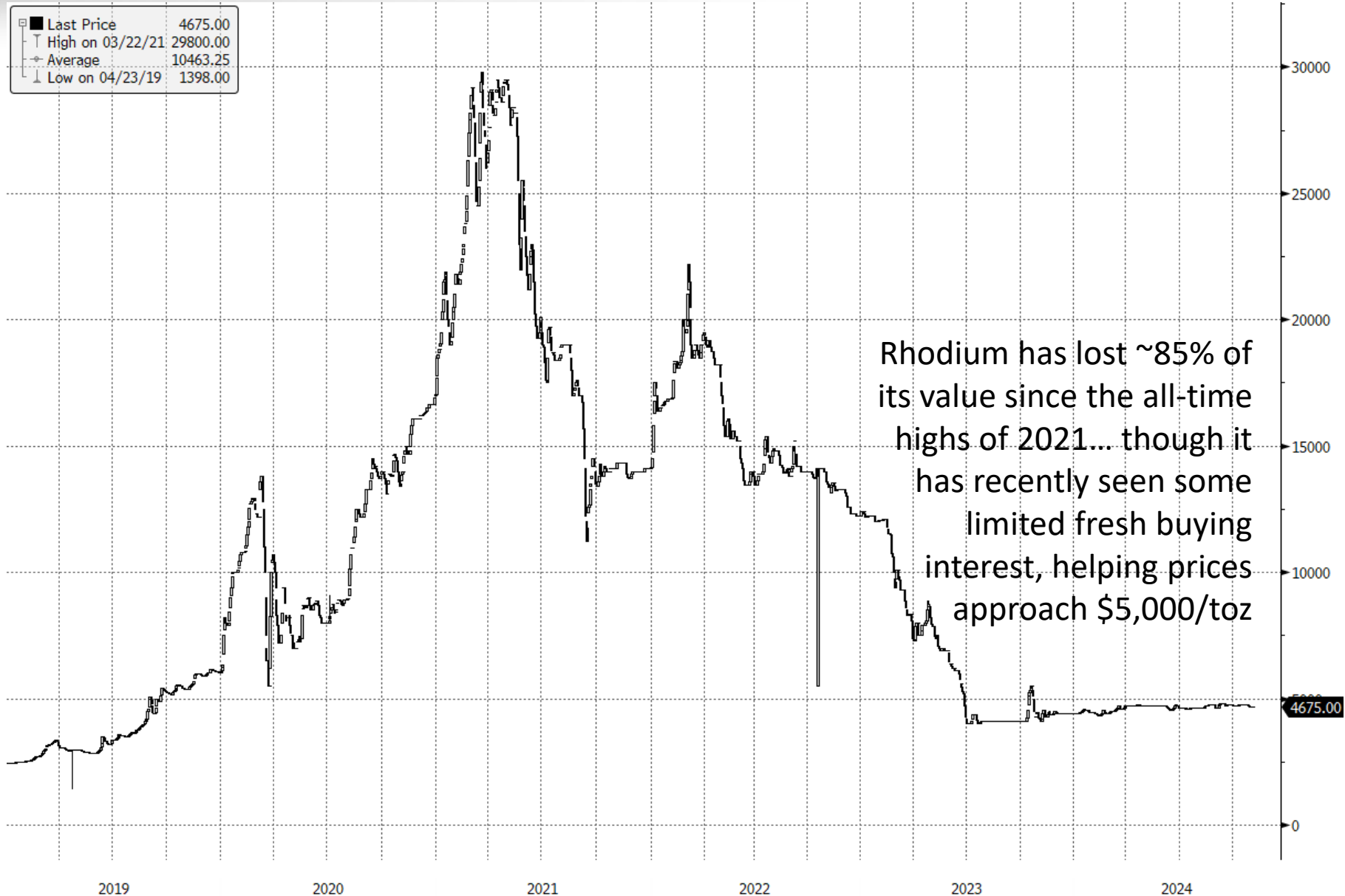
Palladium (US\$/toz)



Source: Mitsubishi from Bloomberg Professional Service

Rhodium: medium term trends

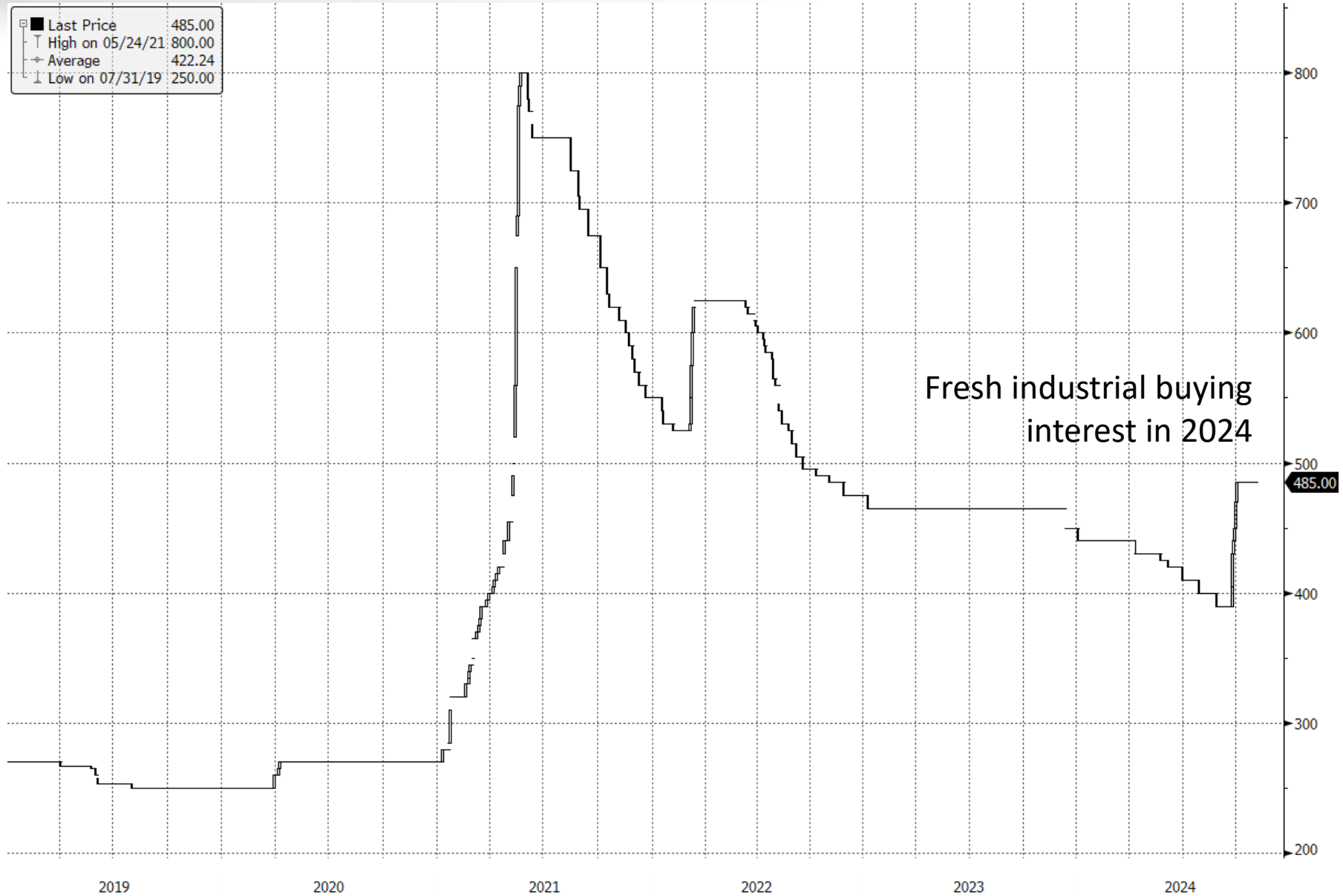
Rhodium (JM Base Price,US\$/toz)



Source: Mitsubishi from Bloomberg Professional Service

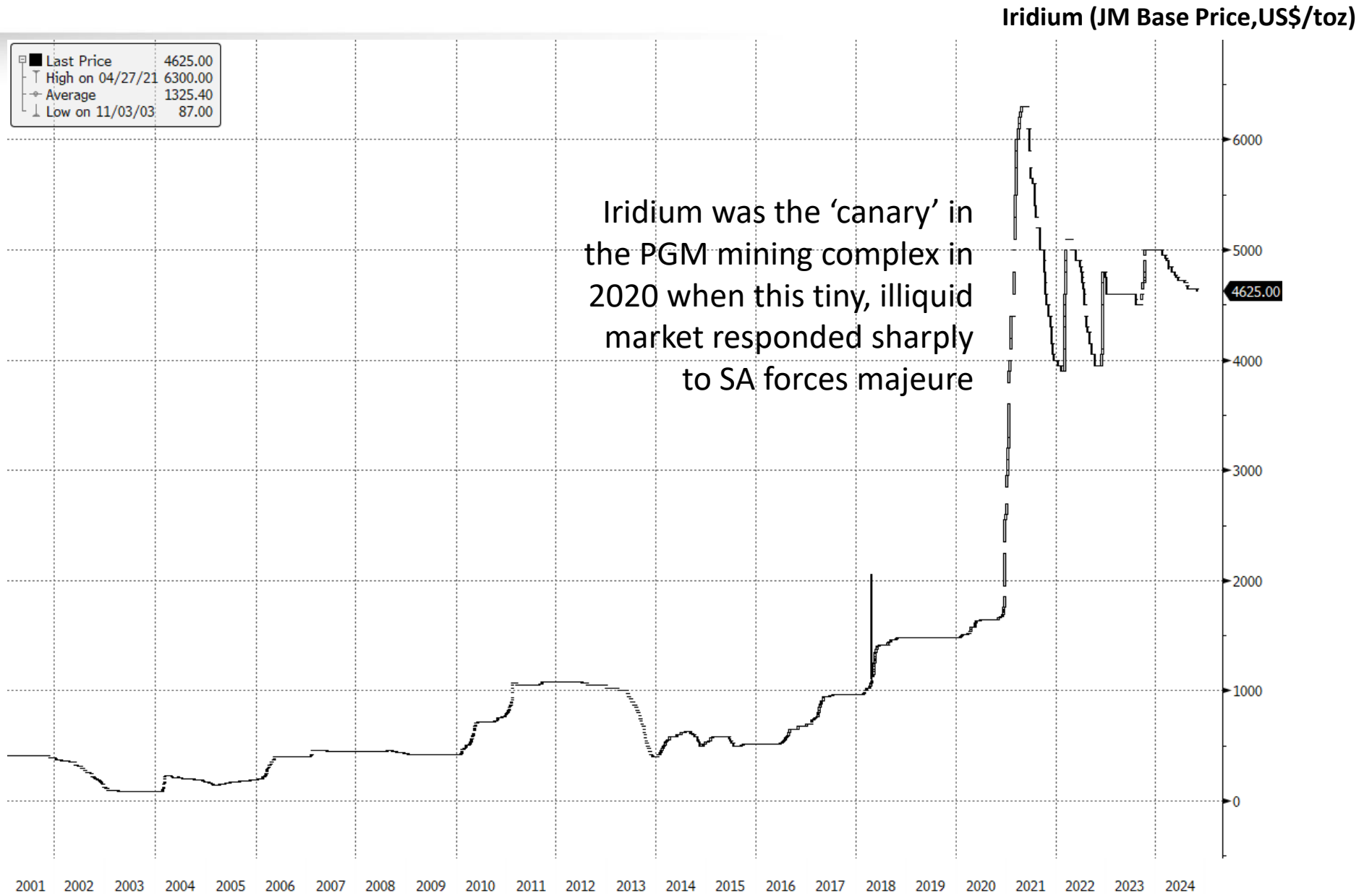
Ruthenium: the sleeper metal

Ruthenium (JM Base Price,US\$/toz)



Source: Mitsubishi from Bloomberg Professional Service

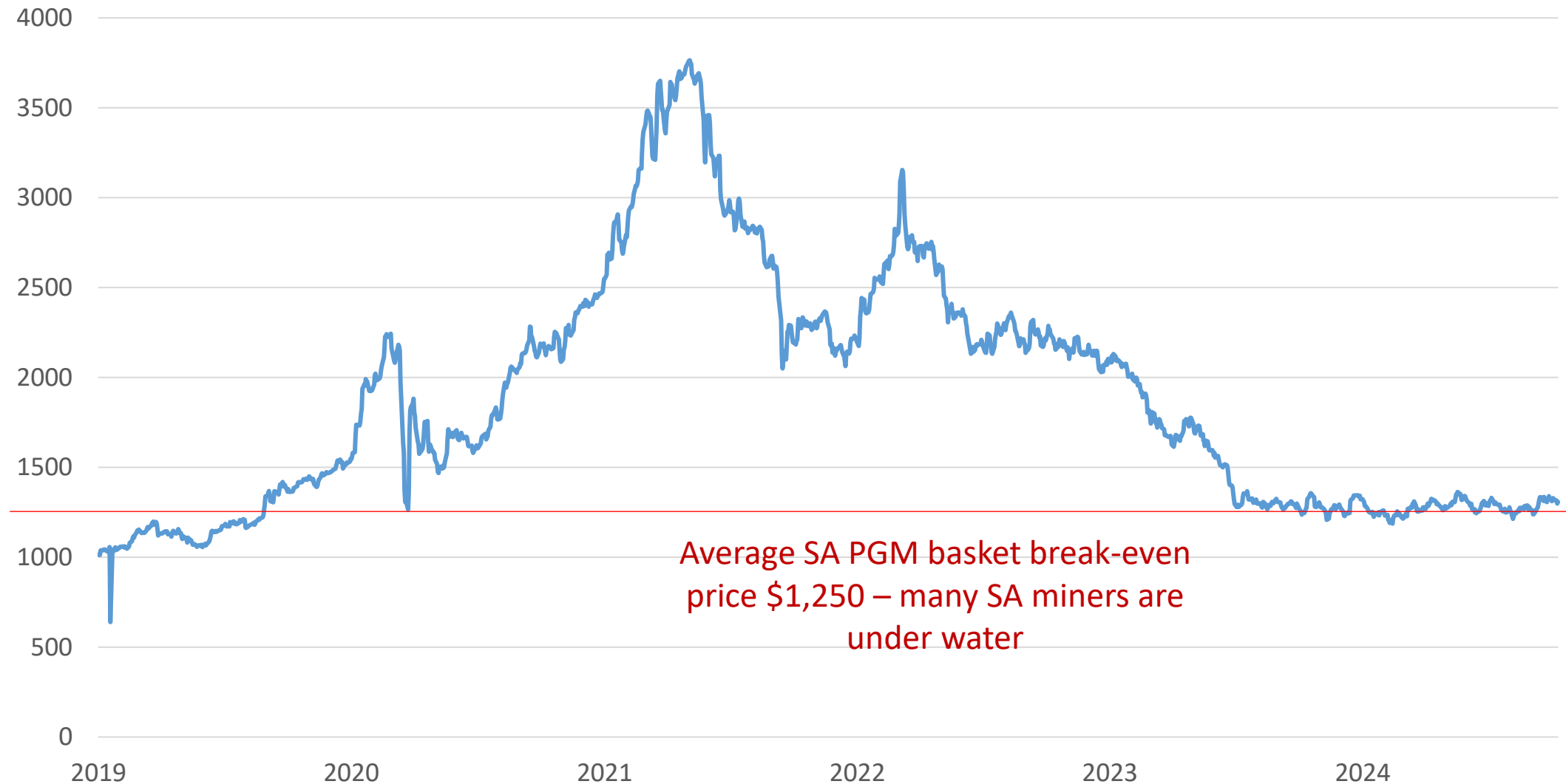
Iridium: hydrogen's favorite metal



Source: Mitsubishi from Bloomberg Professional Service

Supply side: Many South African producers are loss making presently

USD PGM basket price (4E Pt, Pd, Rh, Au) US\$/toz

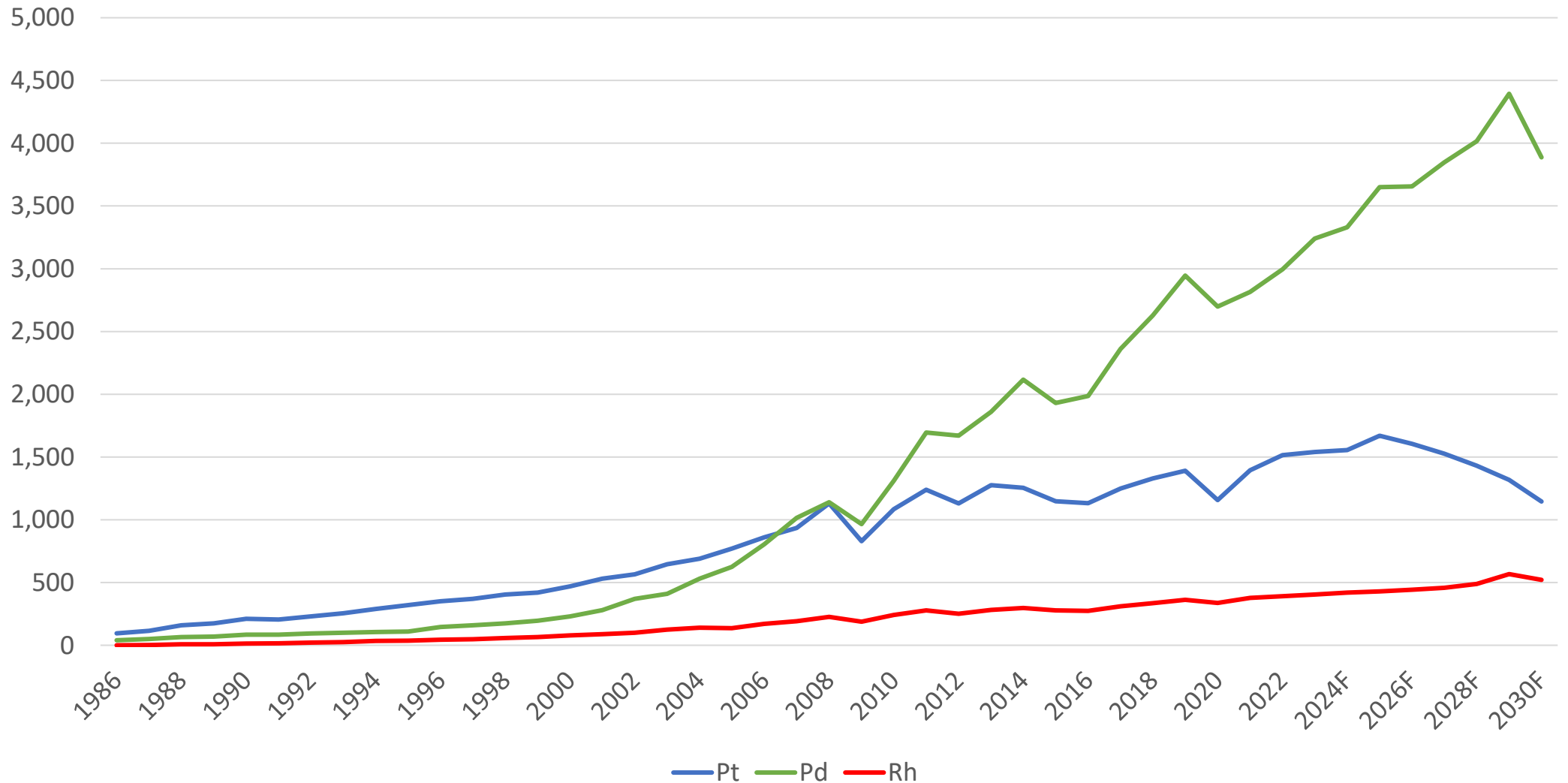


Average SA PGM basket break-even price \$1,250 – many SA miners are under water

Source: Mitsubishi from Bloomberg Professional Service

Autocatalyst recycling: the gift that keeps on giving

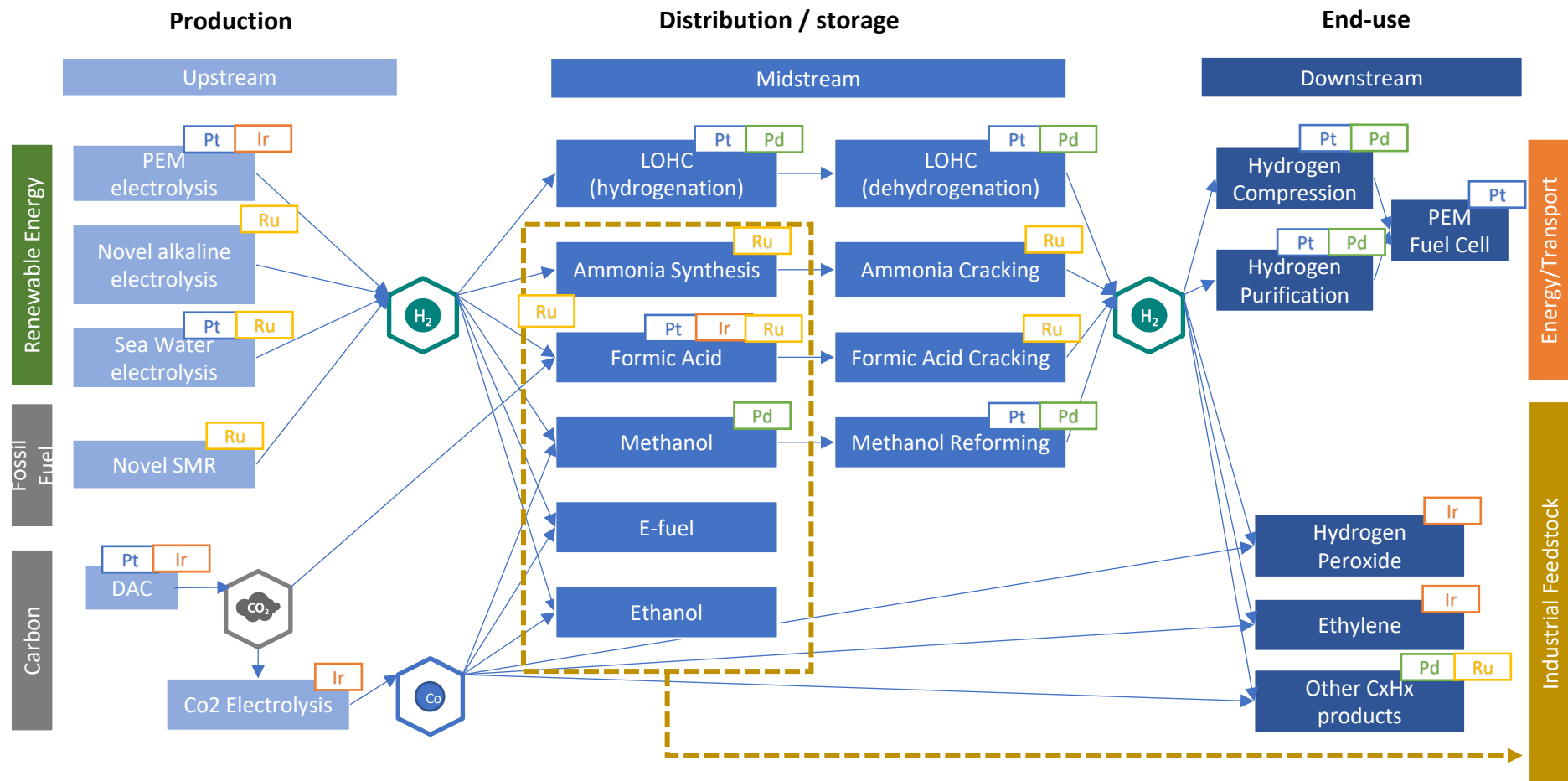
Autocatalyst recycling by metal, historic and Forecast (koz)



Source: Mitsubishi from JM (Historic to 2023) Mitsubishi Forecasts (2024-30)

PGM use in the hydrogen value chain

PGMs and hydrogen are synonymous: making, storing / distributing and using hydrogen requires PGMs

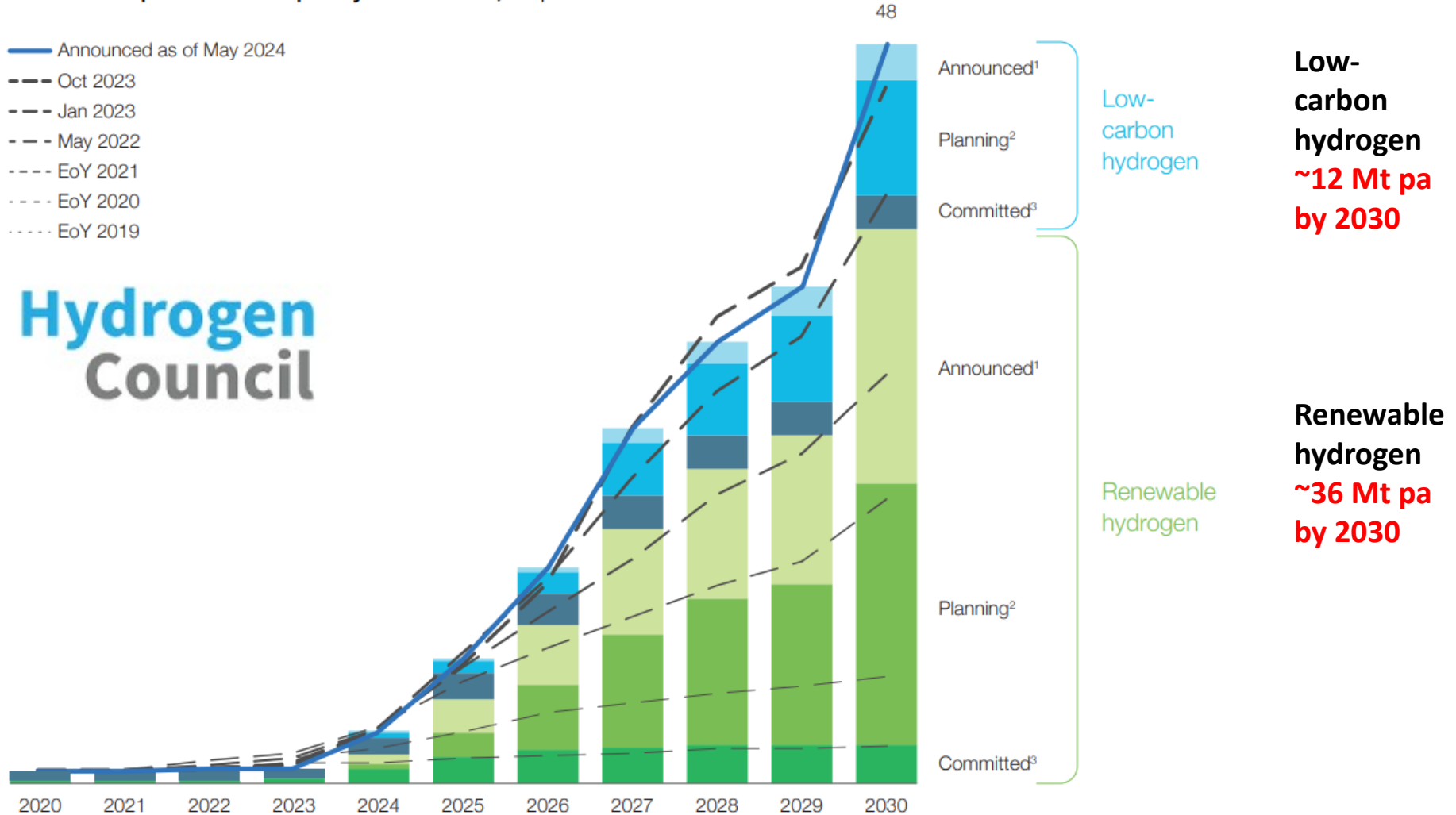


Source: AP Ventures / Mitsubishi Corporation

Current and new clean hydrogen production to 2030

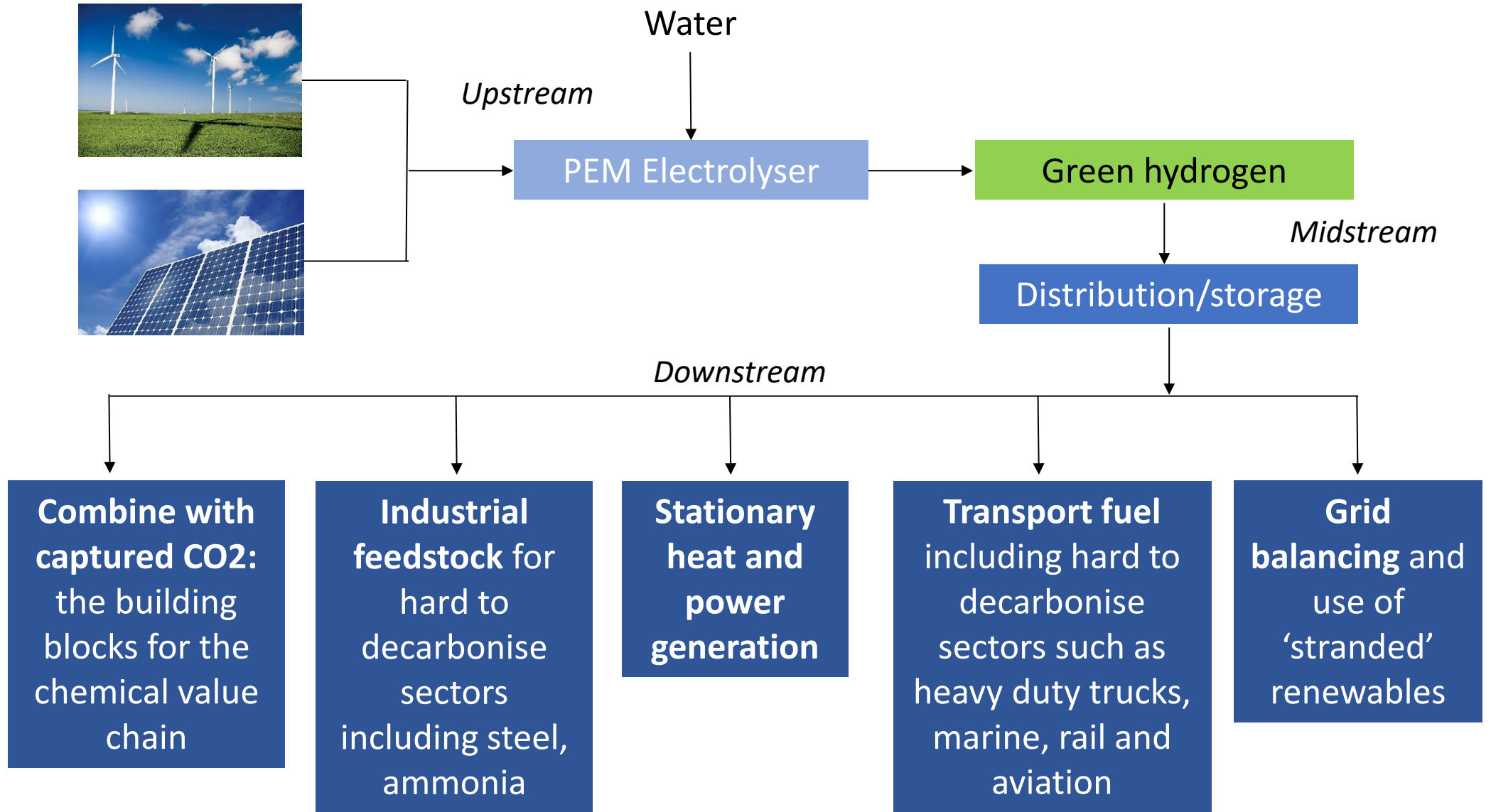
Announced cumulative hydrogen production capacity by 2030 (Mt pa)
As of May 2024

Cumulative production capacity announced, Mt p.a.



Source: Mitsubishi from Hydrogen Council / McKinsey

PEM water electrolyzers: the key to harnessing renewable power

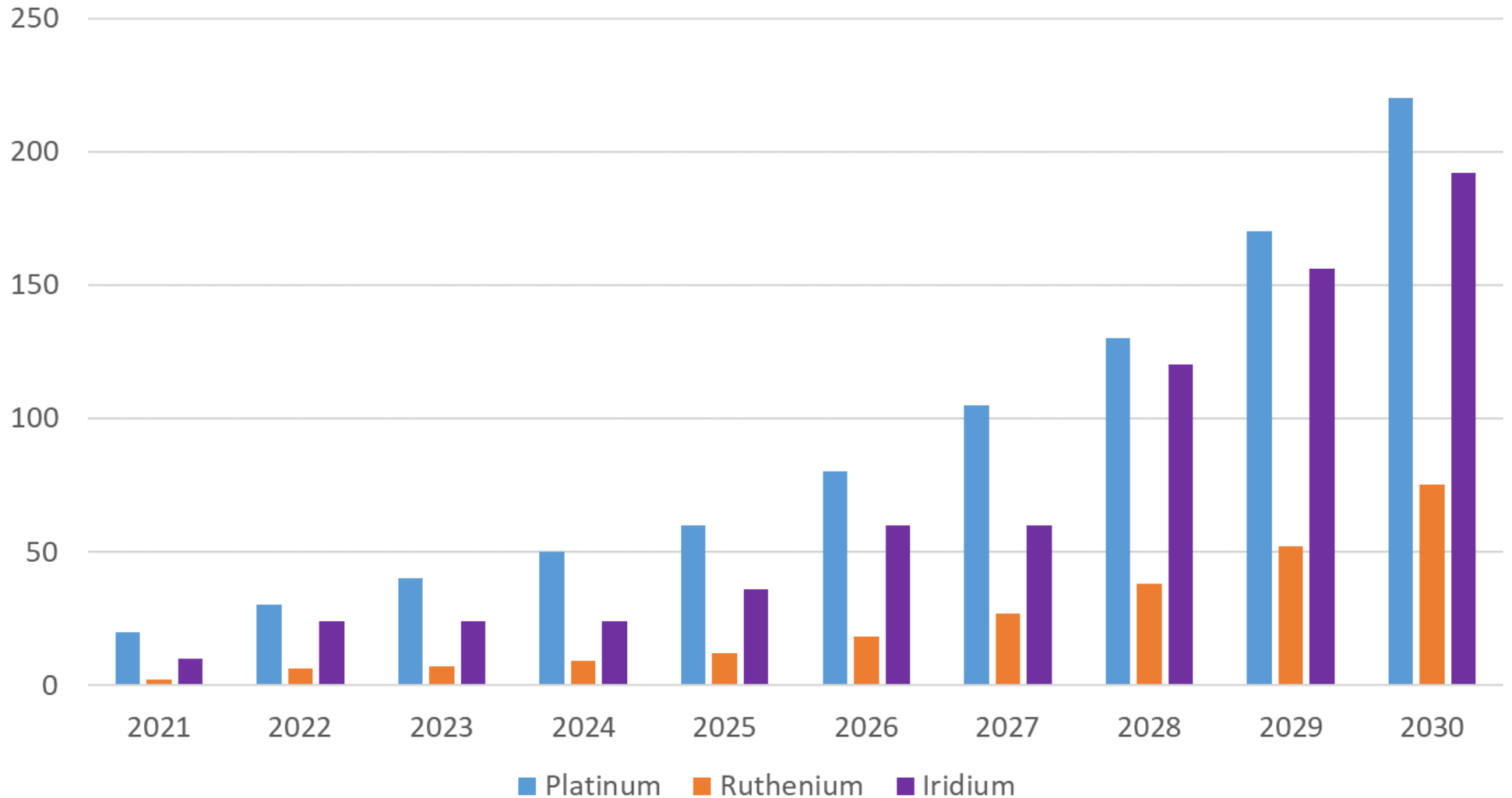


Source: Mitsubishi from World Platinum Investment Council

PGMs in electrolysis: demand forecast

PGM demand in PEM electrolysis

koz

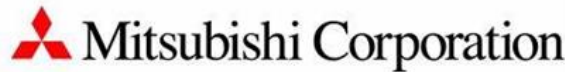
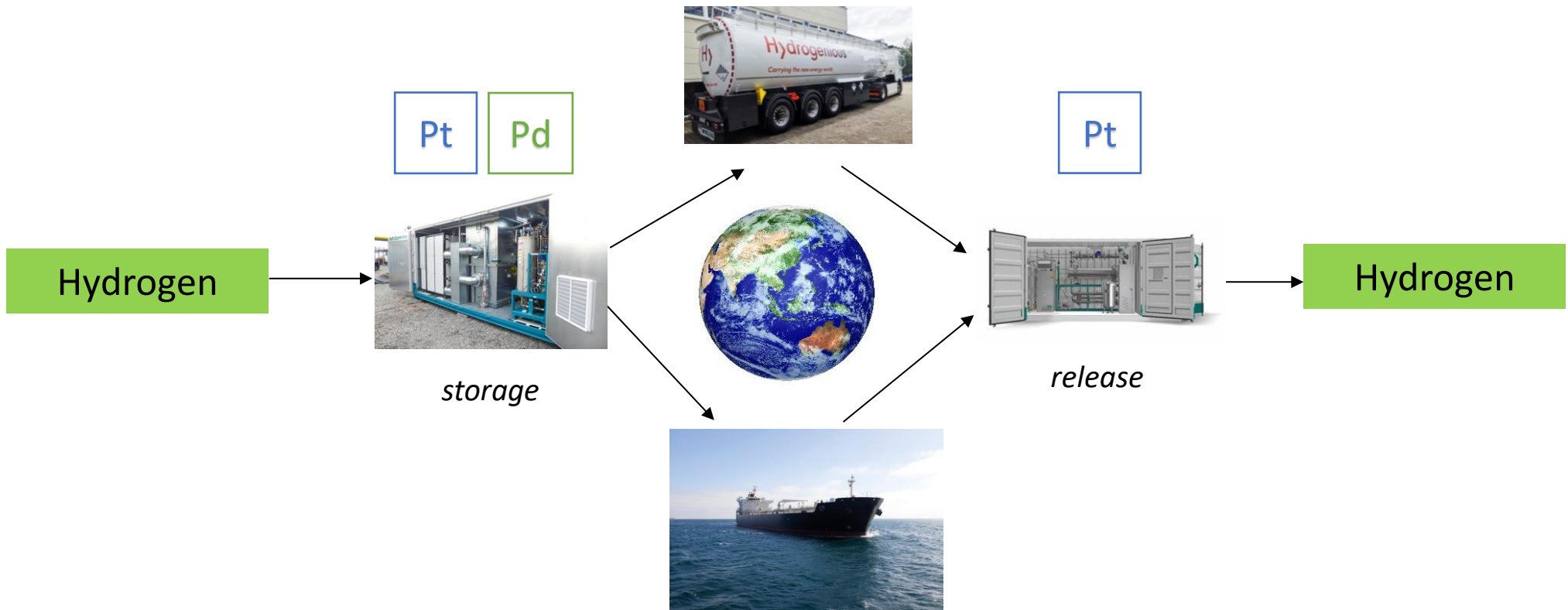


Source: Mitsubishi forecasts

PGMs in distribution and storage of hydrogen: LOHC

Midstream

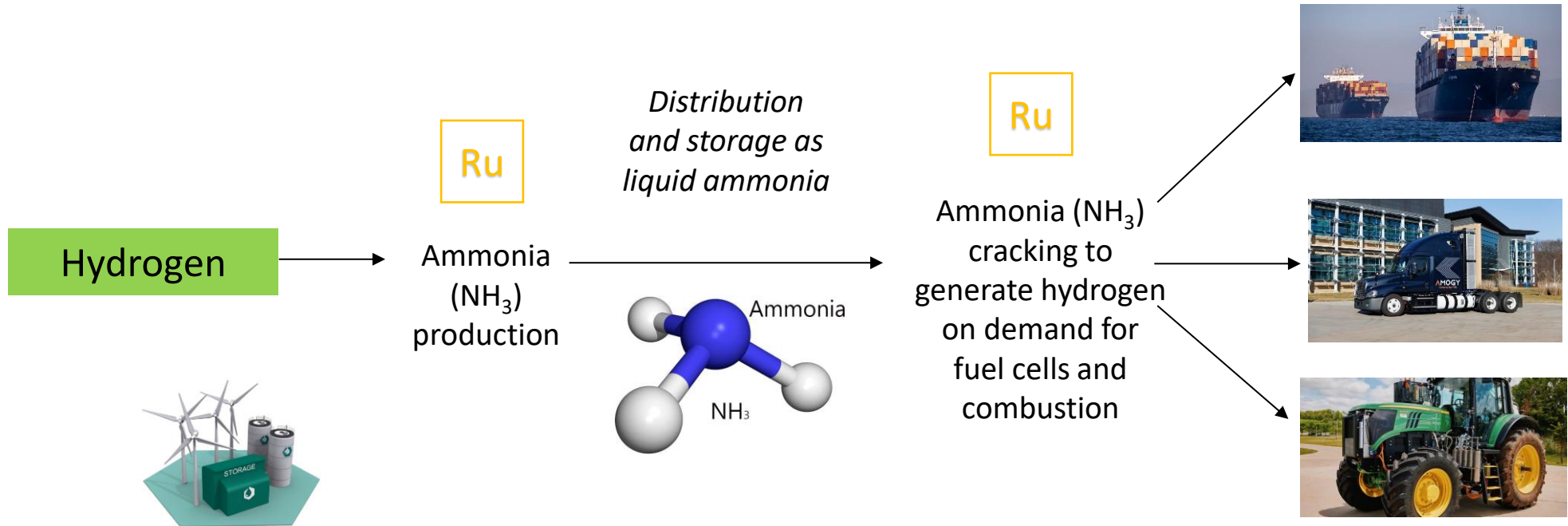
Liquid Organic Hydrogen Carriers (LOHC) hydrogen is stored and transported like oil, allowing bulk storage using existing infrastructure



PGMs in distribution and storage of hydrogen: Ammonia

Midstream

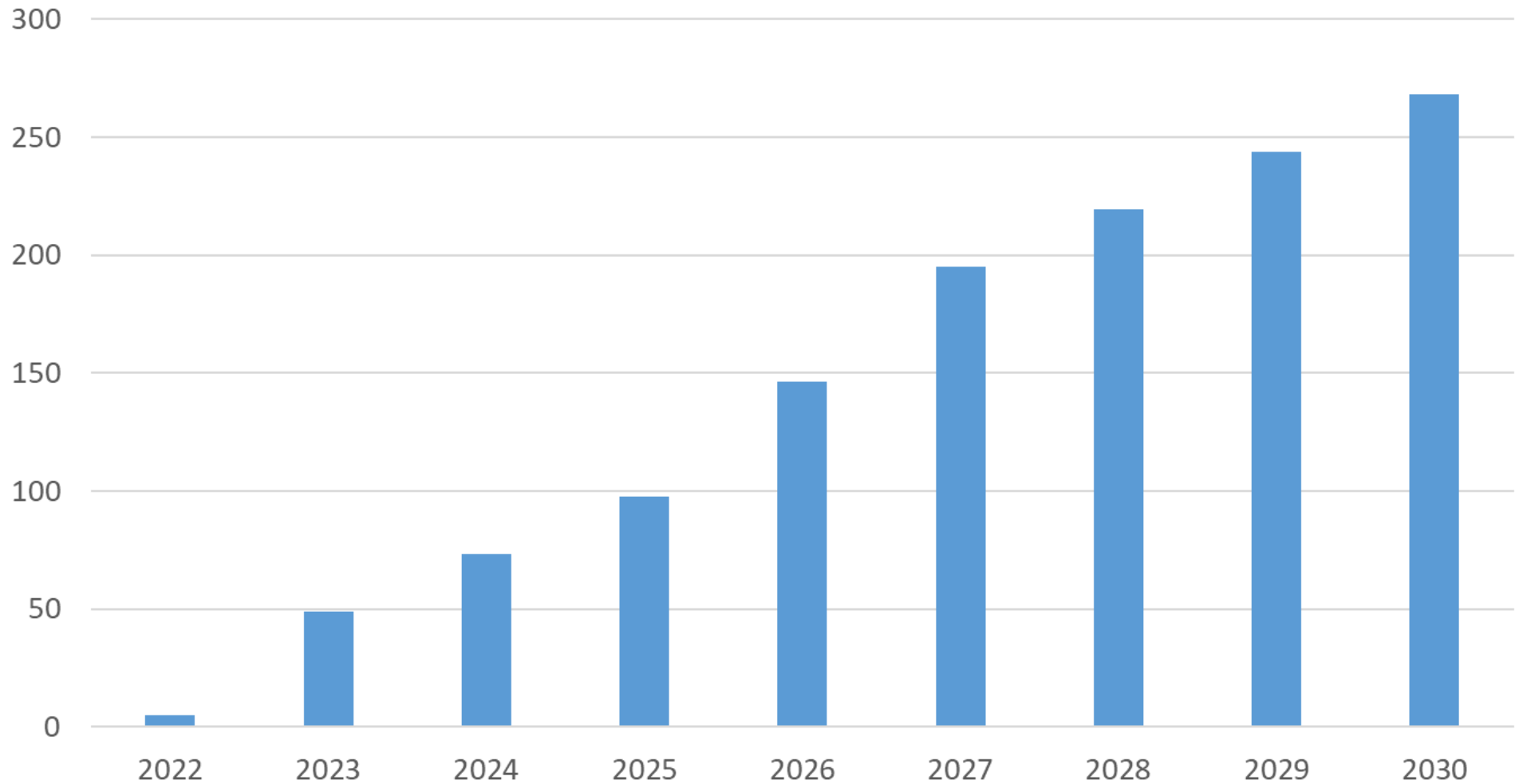
Ammonia is a stable and non-flammable compound that can easily be stored as a liquid, making it suitable for maritime applications and large scale transportation of hydrogen from e.g. stranded renewables



PGM demand in hydrogen distribution and storage: an important niche

Midstream

PGM use in hydrogen distribution and storage (based on limited scale commercial deployments)
koz



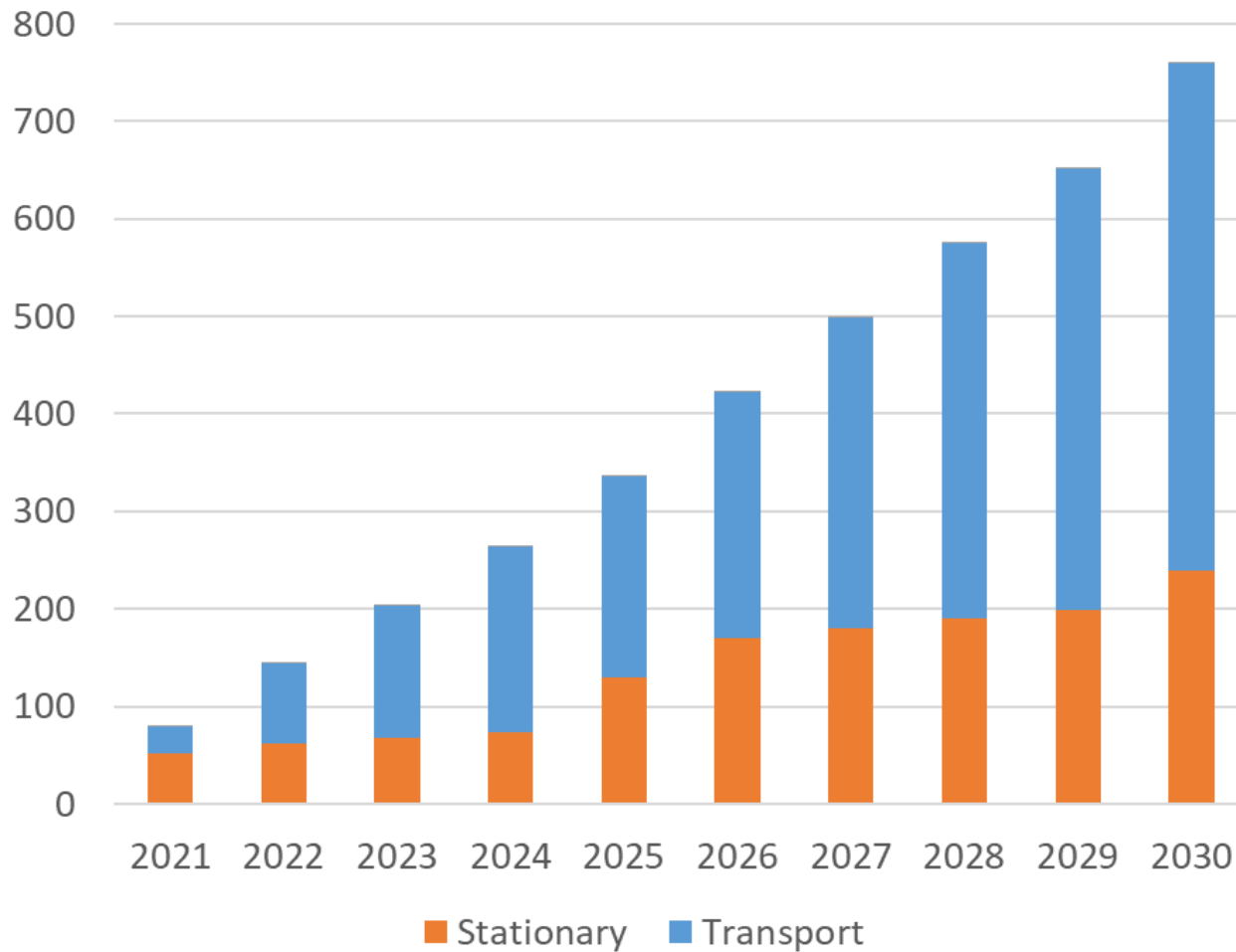
Source: Mitsubishi forecasts

PGM demand in downstream hydrogen applications

Fuel cells: the holy grail of PGM demand in hydrogen

PGM demand by fuel cell type

koz



Source: Mitsubishi forecasts

Downstream

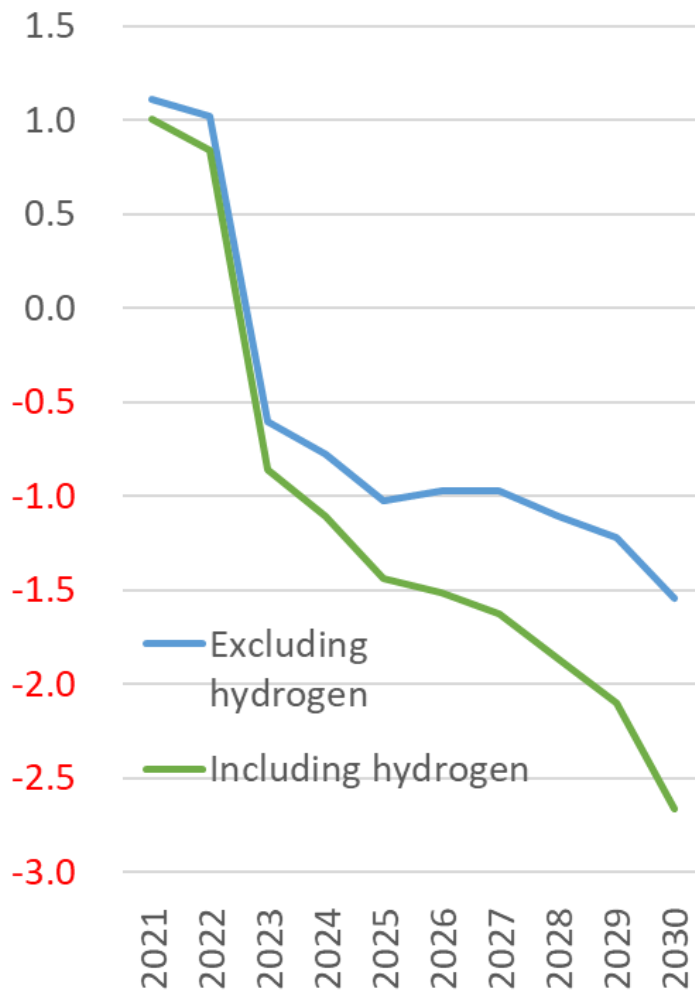


PGM market balance impacts from hydrogen

Supply-demand surplus / deficit

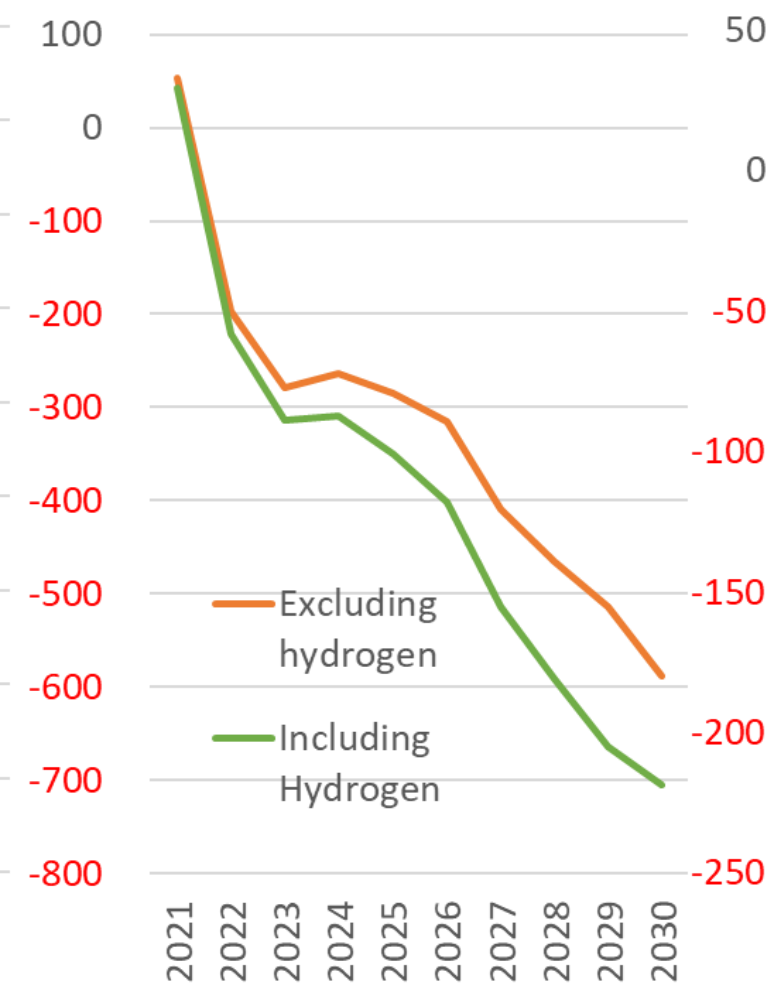
Platinum

Moz



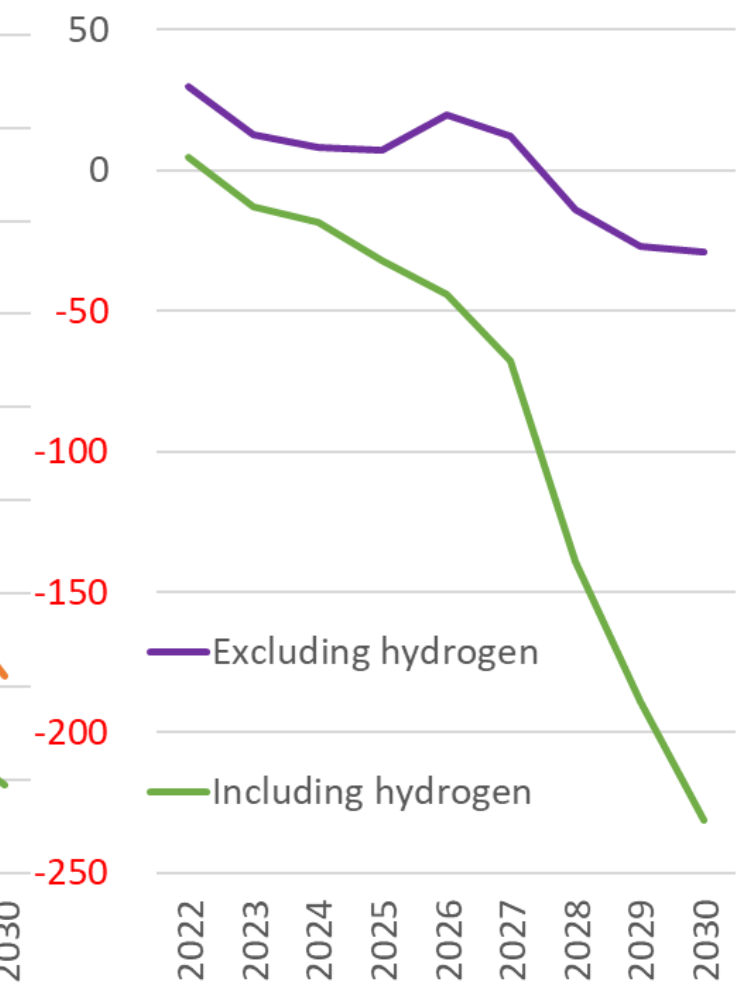
Ruthenium

koz



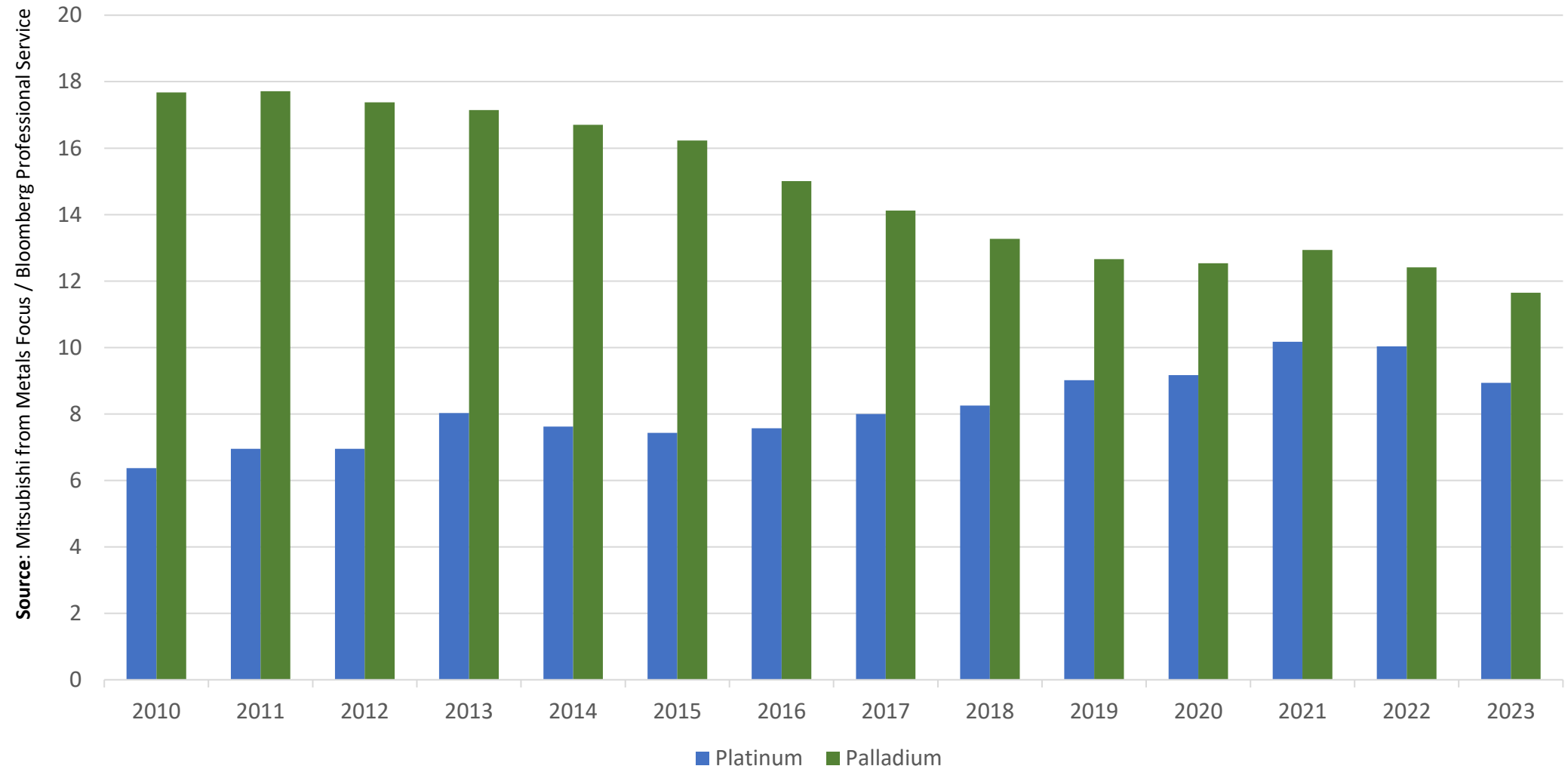
Iridium

koz



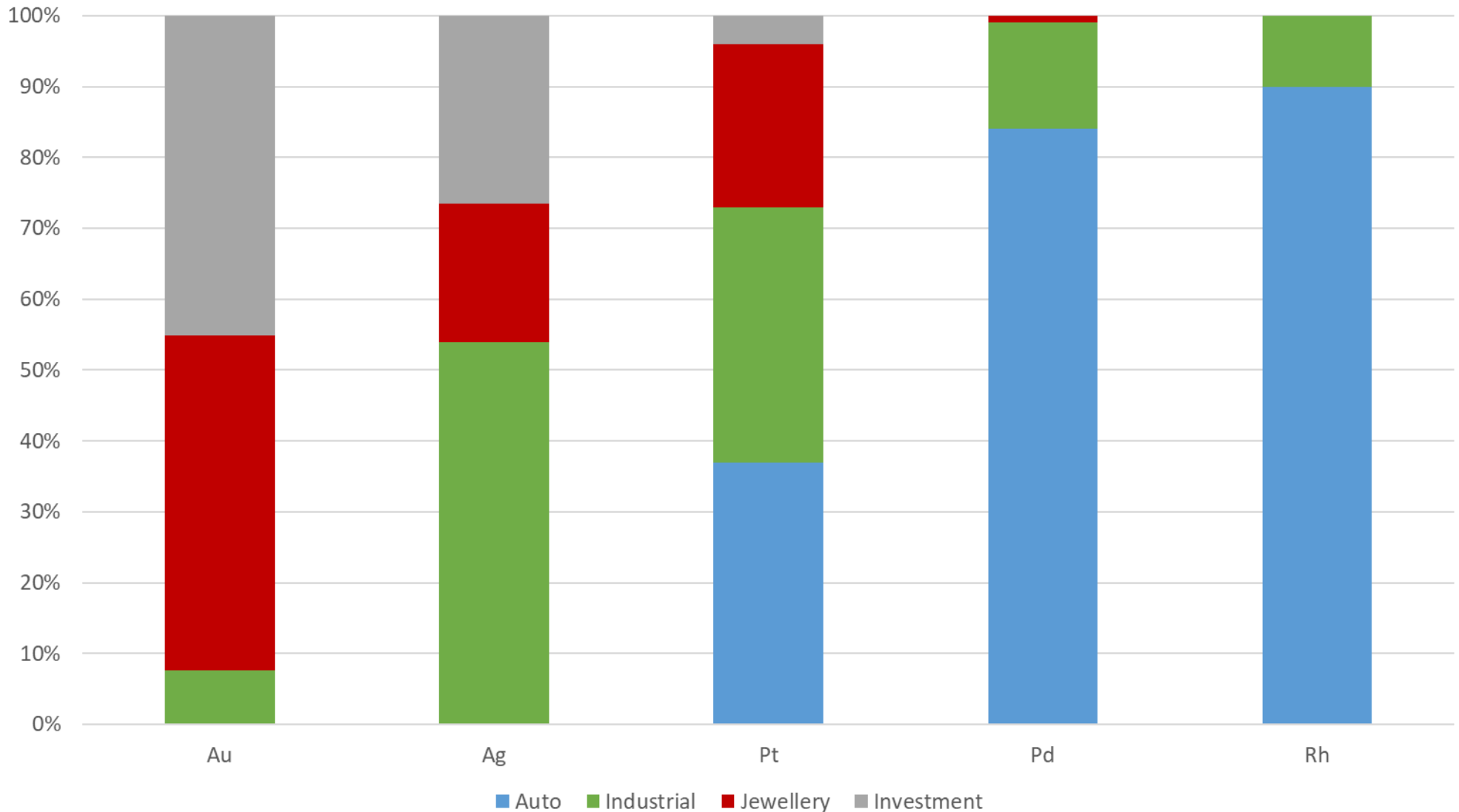
Identifiable above-ground stocks

Above ground physical inventories of Pt and Pd (Moz):



Demand: PGMs at greatest risk of industrial demand slowdown

Share of major demand areas (5 year averages)

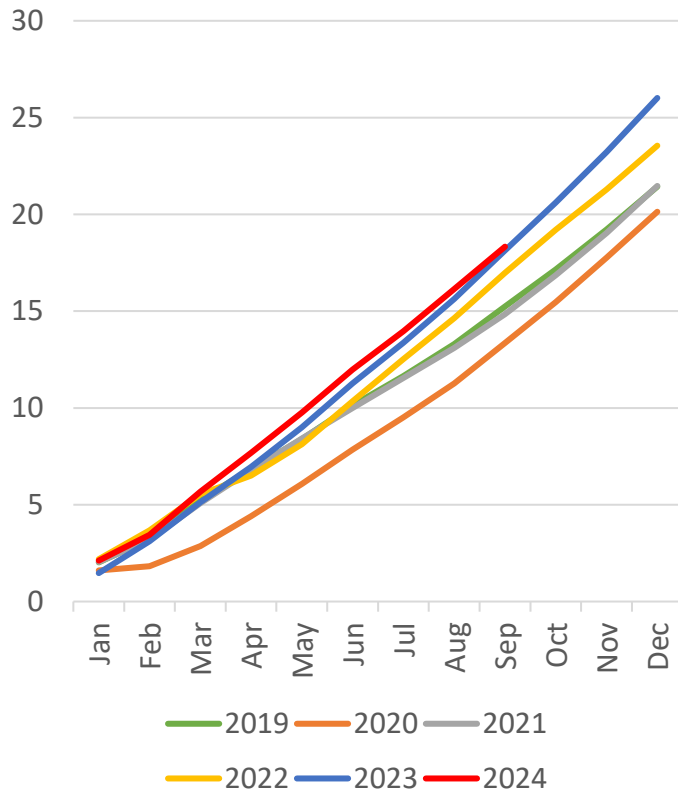


Source: Mitsubishi from Johnson Matthey (PGM data), Metals Focus/World Gold Council (Gold data), Metals Focus/Silver Institute (Silver data)

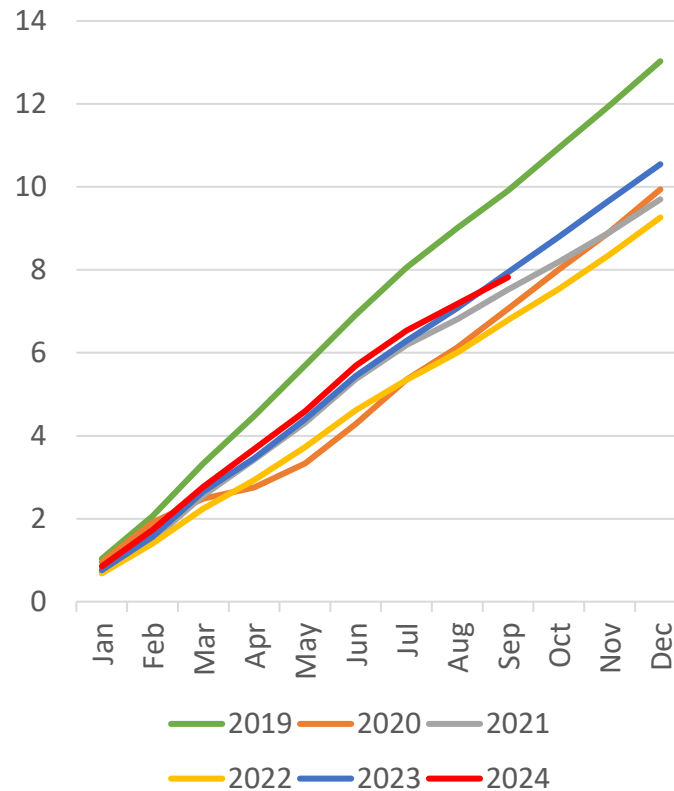
Autocatalyst demand: China, US growing, weakness in Europe

Cumulative car sales in selected markets (millions of units):

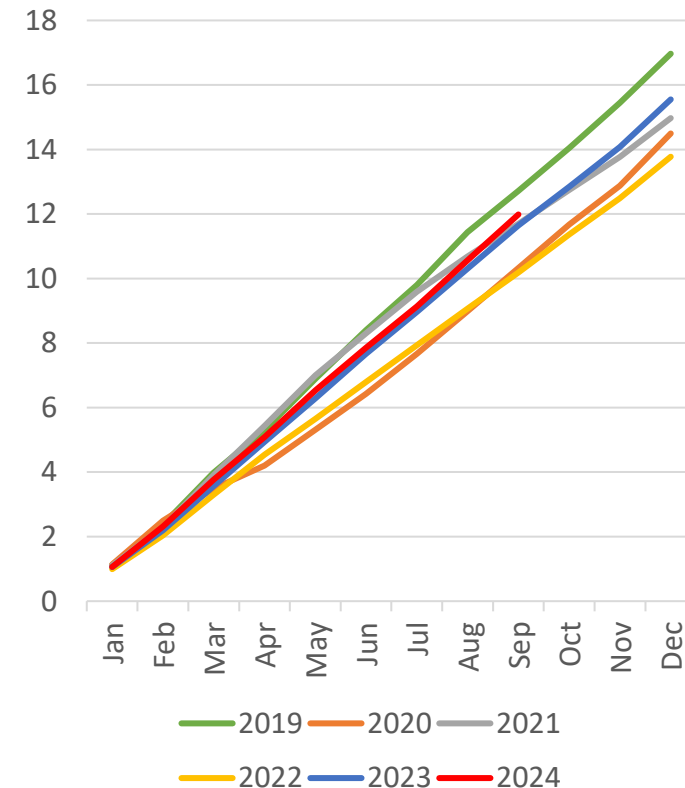
China



Europe



USA

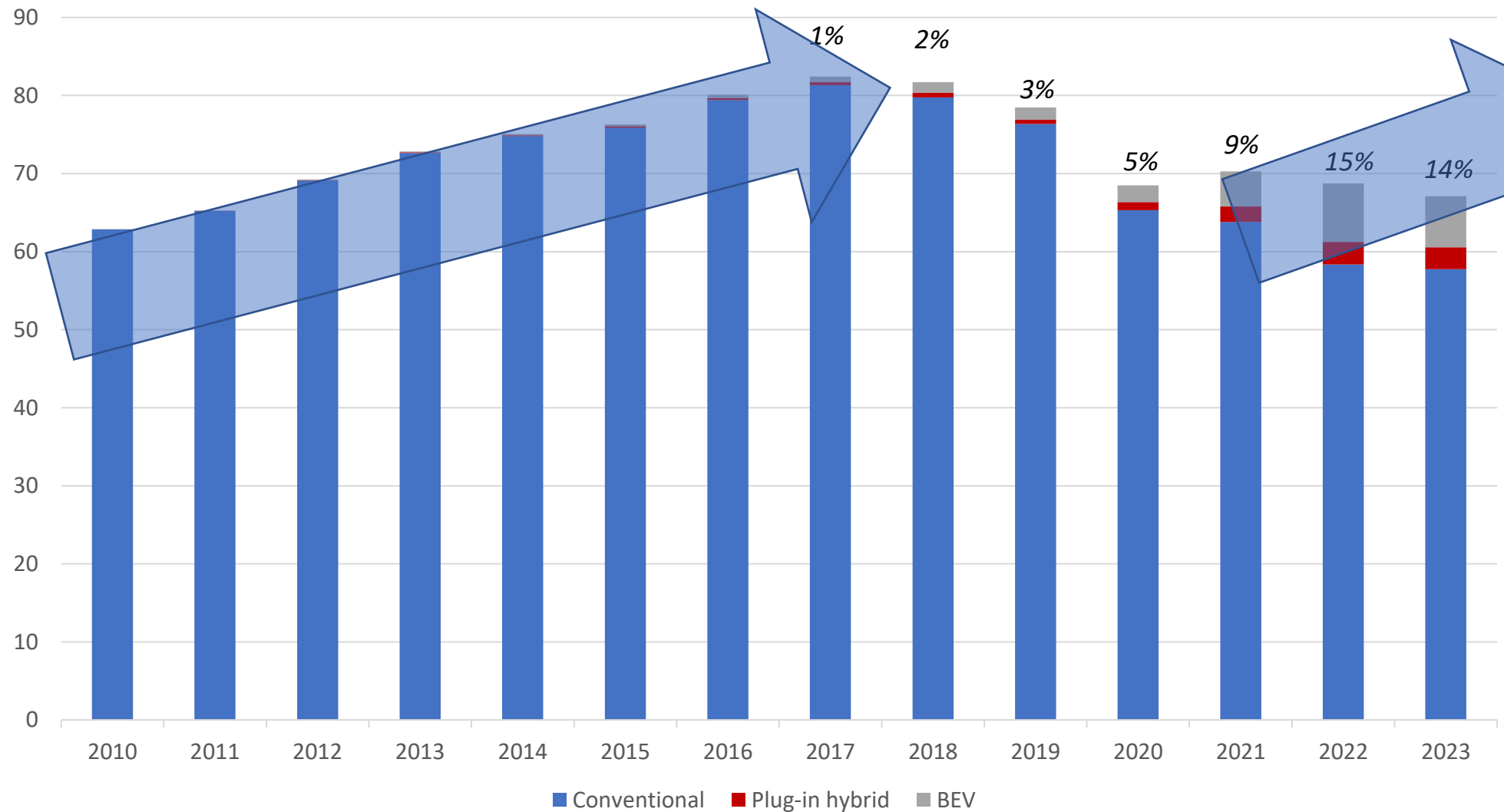


Source: Mitsubishi from Bloomberg Professional Service

Light duty vehicle market share by powertrain

Global Light duty vehicle sales by powertrain (millions of units): *Italics denote BEV market share since 2018*

Source: Mitsubishi from Bloomberg Professional Service / Bloomberg New Energy Finance

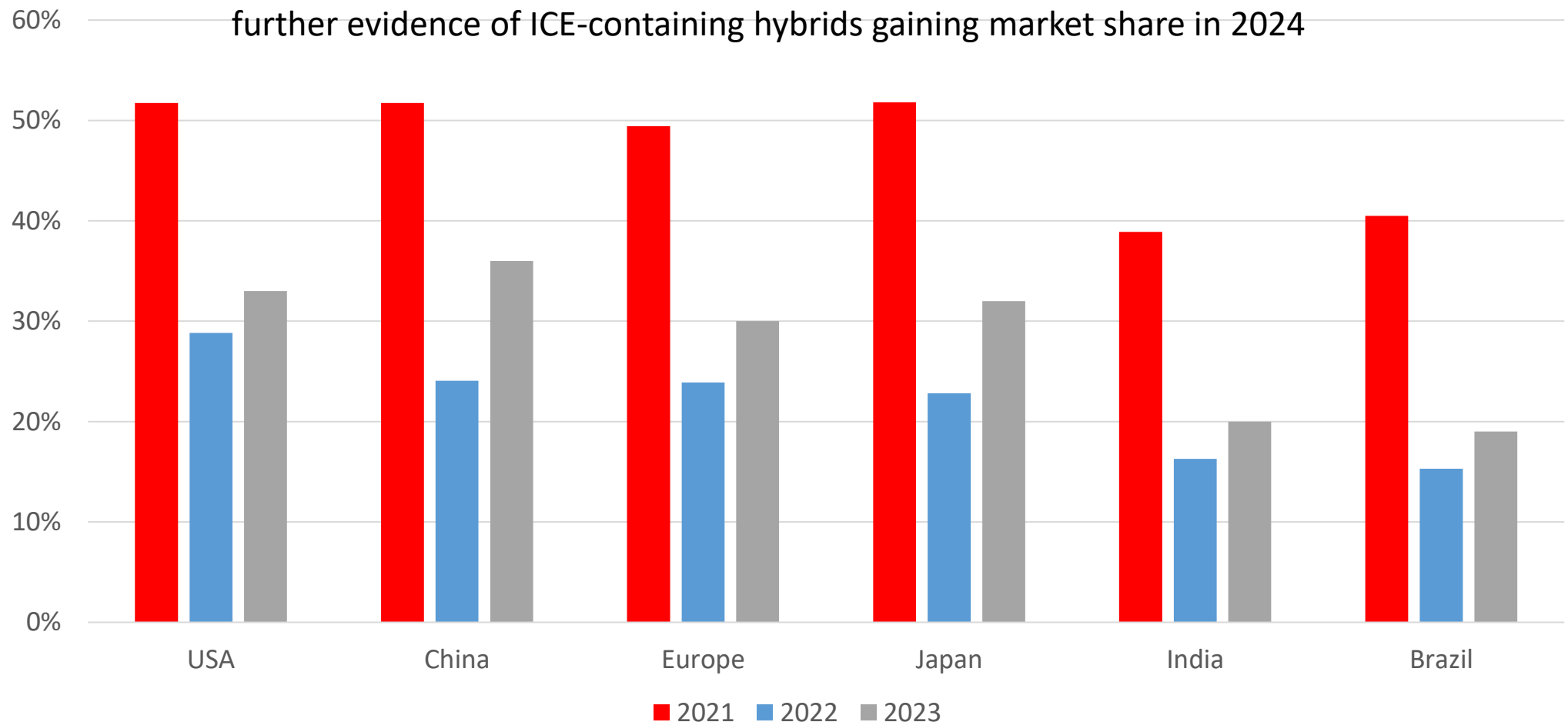


BEV adoption: readdressing the more optimistic forecasts

KPMG'S Annual Global Automotive Executive Survey: comparison of 2021, 2022 and 2023:

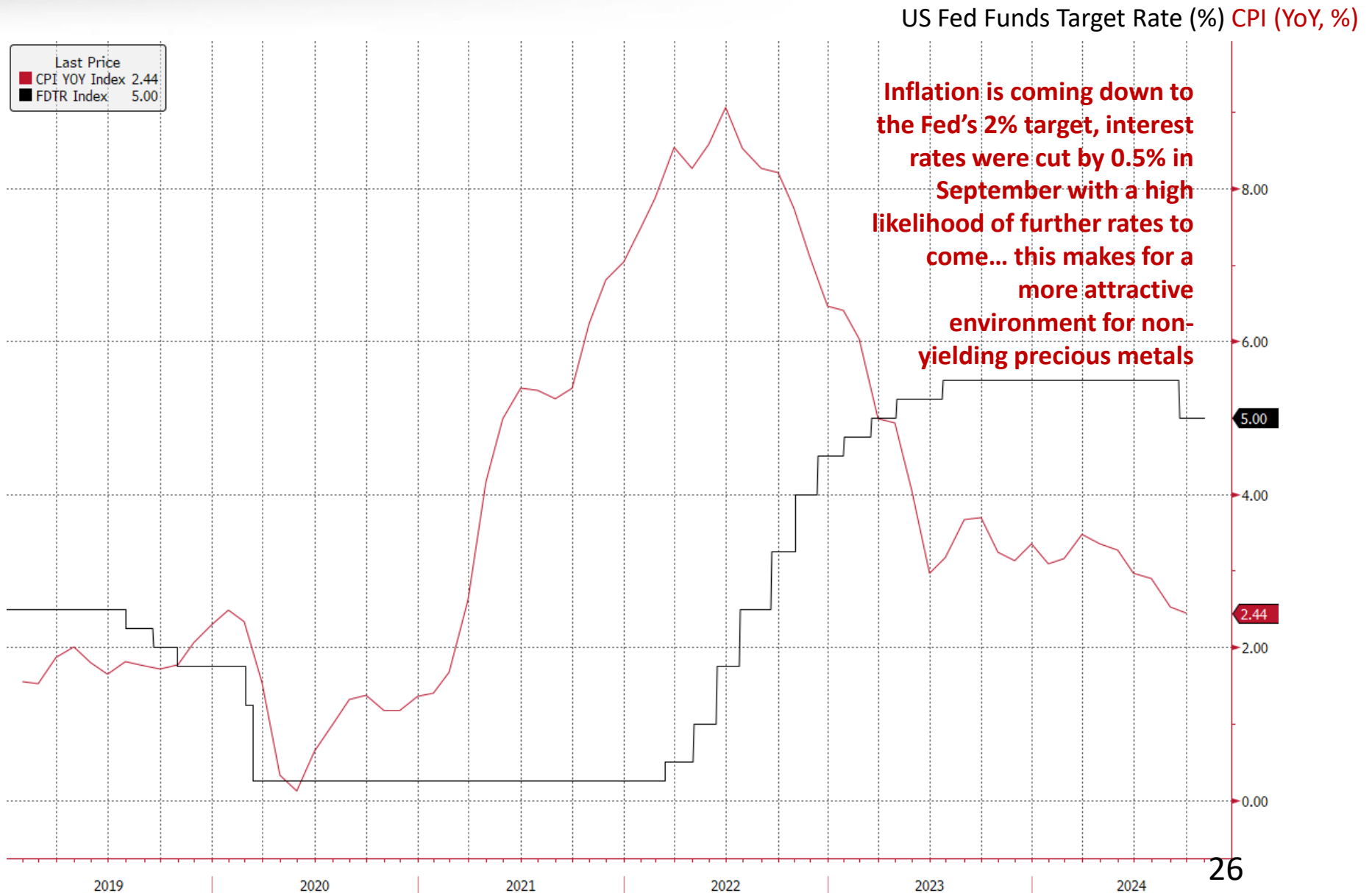
“By 2030, what percentage of new vehicles sales do you believe will be battery-powered (excluding hybrids) within each market?”

Expected BEV adoption by 2030 roughly halved between the 2021 and 2022 surveys with further evidence of ICE-containing hybrids gaining market share in 2024



Source: Mitsubishi from KPMG Global Automotive Executive Survey 2021, 2022 and 2023 <https://experience.kpmg.com/gaes-2022#/subpage/home>

US interest rates have begun to be cut

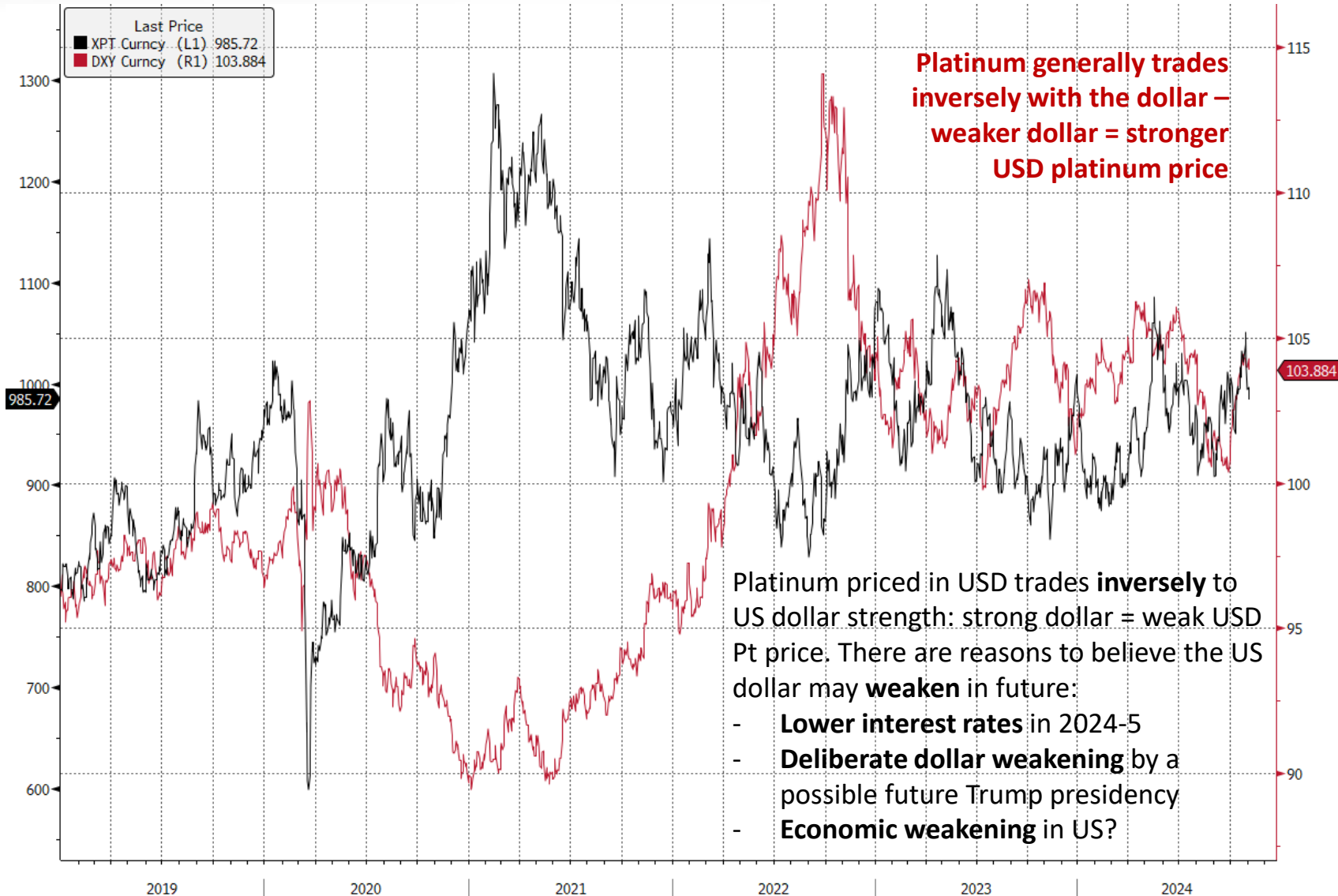


Source: Mitsubishi from Bloomberg Professional Service

US dollar weakness helps platinum... sometimes

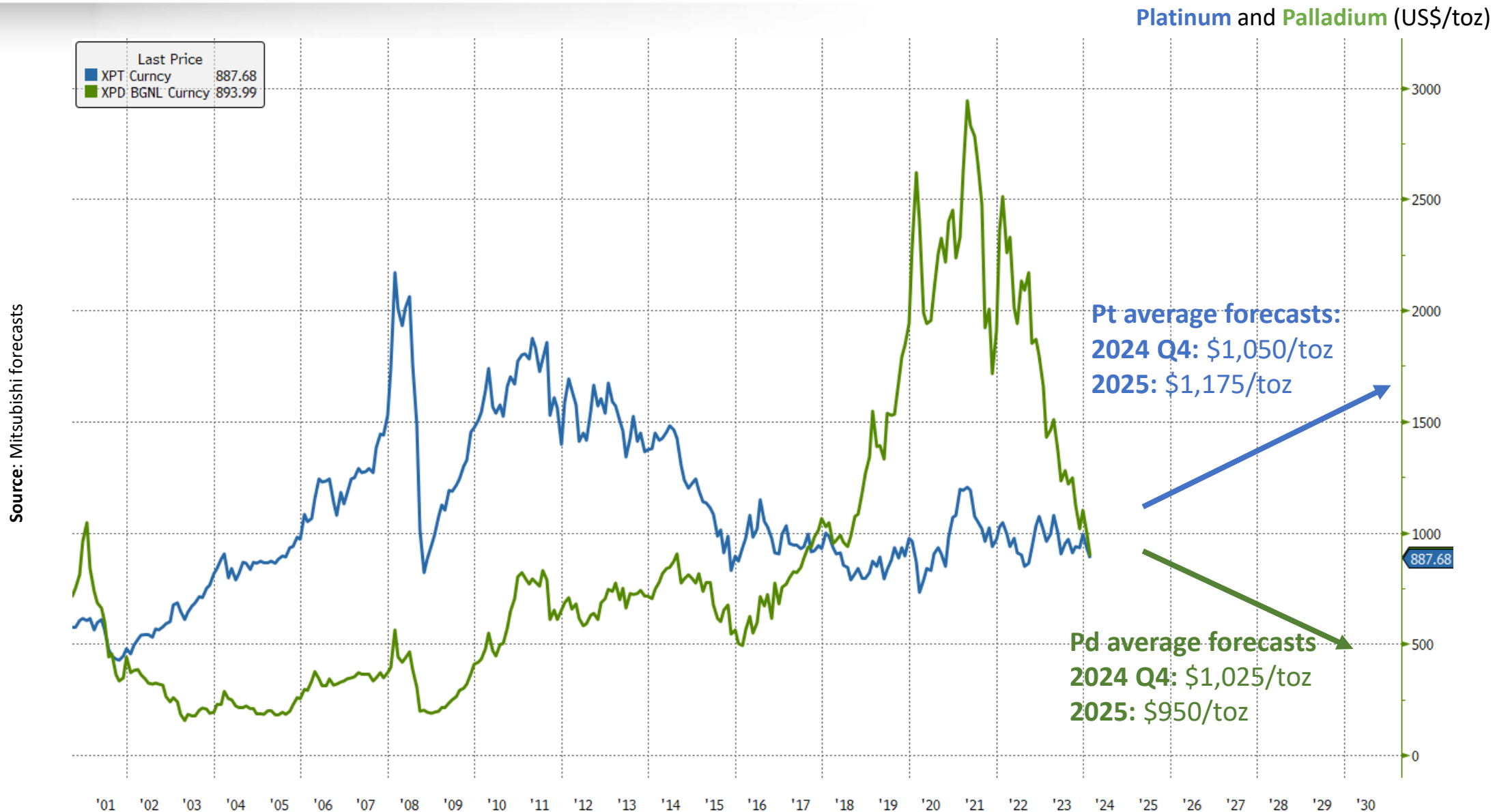
Platinum (US\$/toz)

US Dollar Strength Index (DXY)



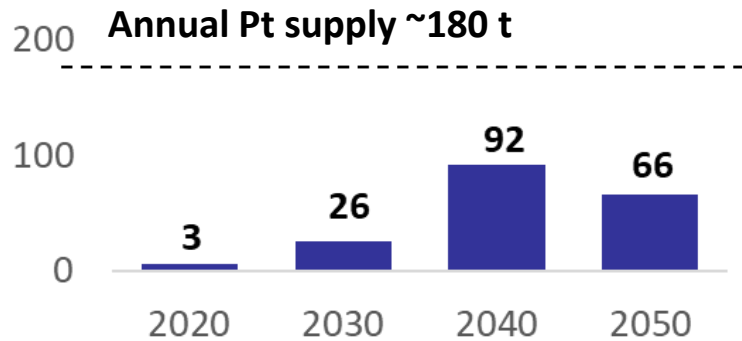
Source: Mitsubishi from Bloomberg Professional Service

Platinum / Palladium short to medium term forecast

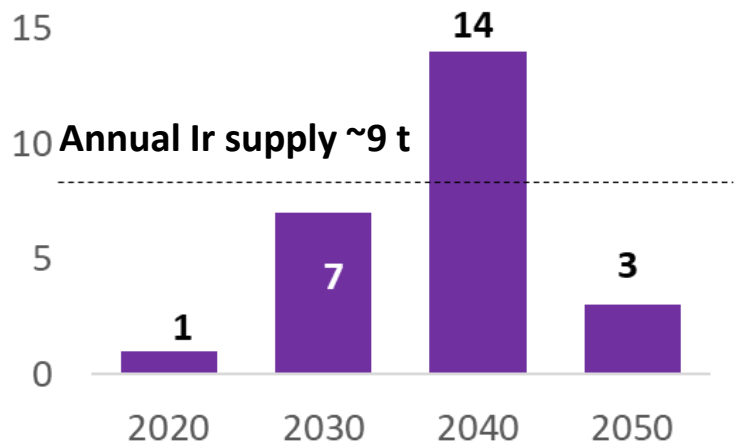


PGMs in hydrogen: the collective challenge






Projected impact of hydrogen on Platinum demand (assumes today's technology) tonnes



Projected impact of hydrogen on Iridium demand (assumes today's technology) tonnes



Source: Mitsubishi forecasts

-  **Reduce loadings**
-  **Recycle more efficiently**
-  **Re-engineer catalysts**
-  **Ring-fence supply**
-  **Risk-hedge metal price**

Thank you!

Mitsubishi Precious Metals Business Services

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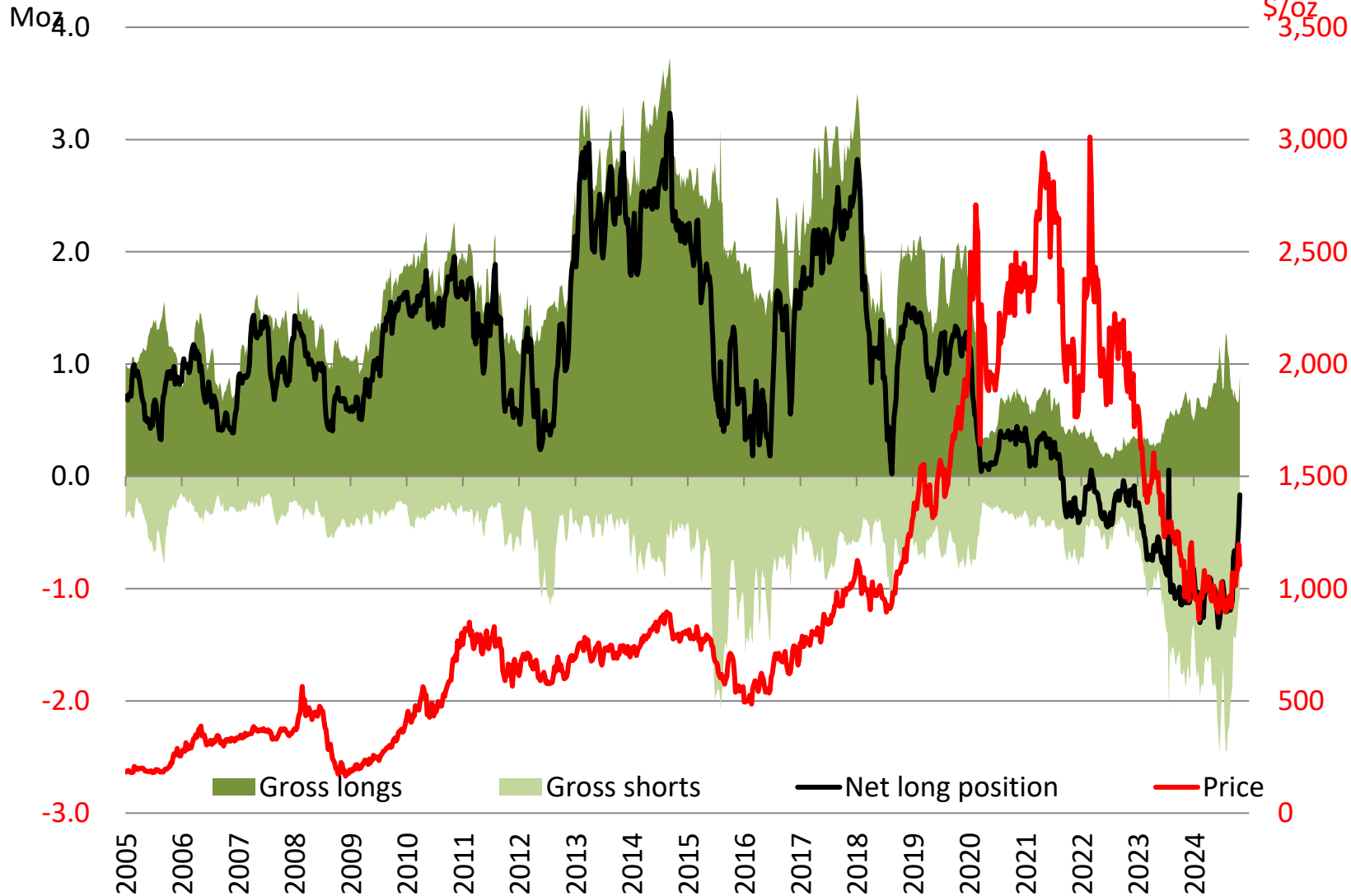
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RtM



The big Pd short: speculative short covering has driven Pd prices higher

NYMEX Pd non-commercial Net long/**short** position



Palladium

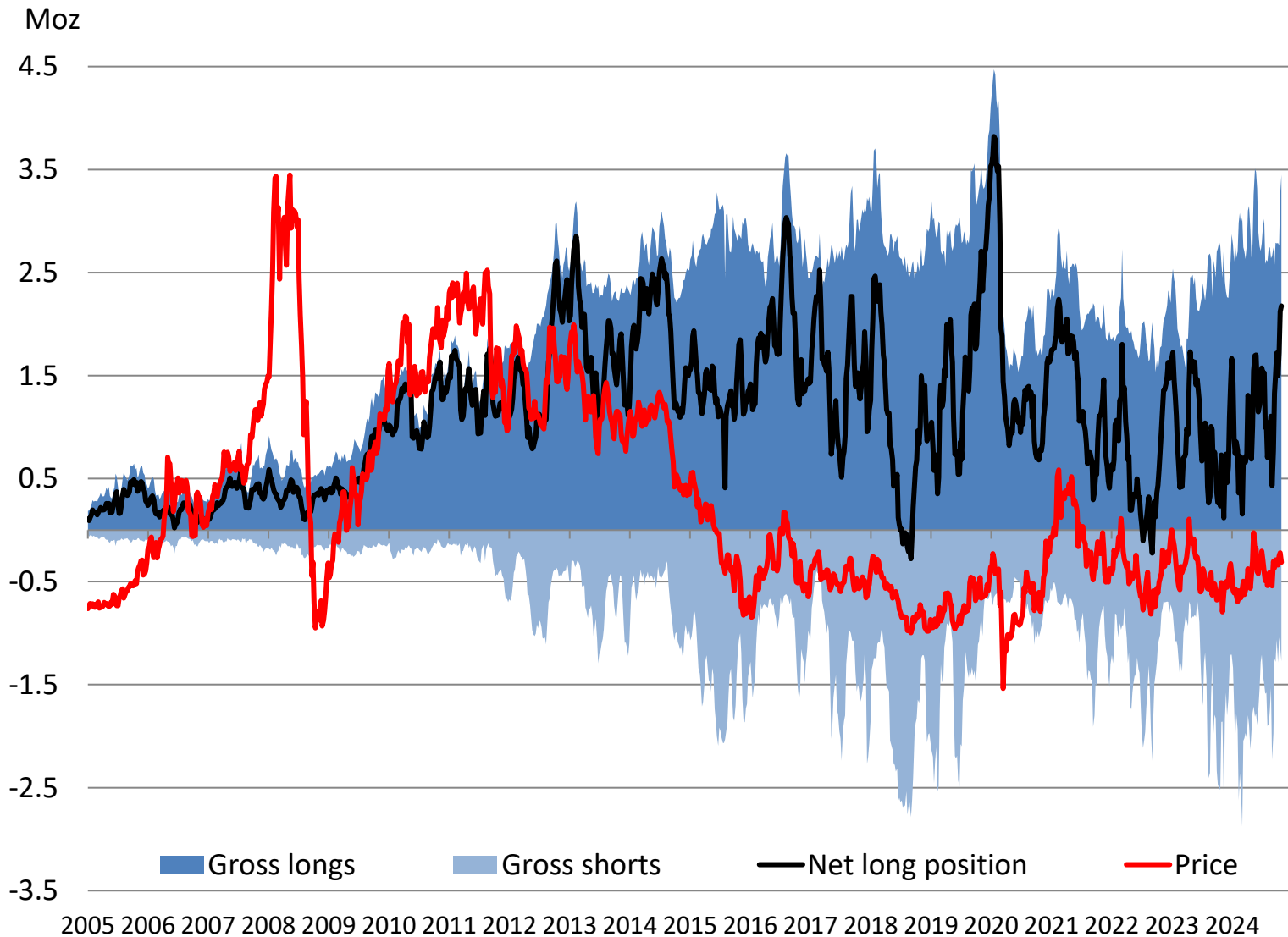
Gross long positions are at just ~900 koz (24% of the all-time high)

Net short position is 163 koz (having been at 1.35 Moz in mid June) much of the short covering rally appears to be over

Gross short positions remain elevated at under 1.1 Moz (though down from the record of 2.5 Moz in mid-June)

Platinum: investors are getting more bullish – 1.7 Moz net length added in 2m

NYMEX Pt non-commercial Net long/short position



Platinum

\$/oz

2,500

2,000

1,500

1,000

500

0

Gross long positions are at 3.5 Moz (77% of the all-time high)

Net long position of 1.3 Moz (44% of all-time high) – suggesting a mild bullishness among money managers

Gross short positions are at 2.1 Moz (57% of the all-time high)