

PLATINUM PERSPECTIVES

Is platinum demand growth from fuel cells relevant yet?

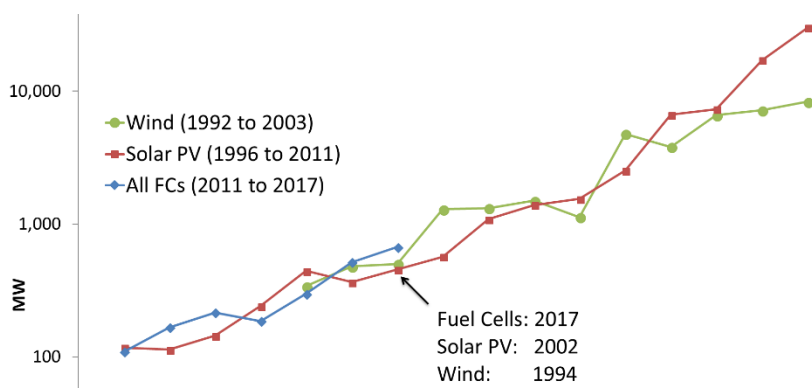
The power capacity of stationary and mobile fuel cells in 2017 equalled the power from wind turbines in 1994 and from solar photovoltaics in 2002; as both were on their way to mass adoption. Wider acceptance of fuel cell platinum demand growth could stimulate increased platinum investment.

Market view: Battery Electric Vehicle (BEV) production is likely to dominate short-term growth in electric vehicles and Fuel Cell Electric Vehicle (FCEV) adoption will be very slow – if at all. Consequently, platinum demand growth from fuel cells is placed beyond most investment horizons.

Our view: We believe historic bouts of fuel-cell-adoption over-exuberance have led to widespread conservatism in published growth forecasts. Growth in platinum-based fuel cell applications was dominated by backup power and warehouse forklifts (Wall Mart, Coca Cola and Amazon), and led growth from 2011 but annual FCEV platinum demand has grown at over 150% p.a. since 2015. **Increasing adoption of all fuel cells is enhancing hydrogen infrastructure**, with hydrogen refuelling stations up 80% to 328 in 3 years. China, which currently has New Energy Vehicle incentives for FCEVs well above those for BEVs, is expected to install 300 new hydrogen refuelling stations by 2025.

BEVs and FCEVs are not mutually exclusive. Observers fail to attribute the benefits to FCEVs of **recent heavy investment by carmakers into BEVs**. The high degree of commonality between the two platforms **benefits FCEV development**. FCEVs also offer quick refuelling and significant range benefits. Johnson Matthey, a manufacturer of fuel cell components, published fuel cell platinum demand in 2017 of c40 koz, which surprised many. We expect current growth rates to continue, supporting 2019 demand of c70koz. The power capacity of the 30,000 Toyota FCEVs it plans for 2021 will, alone, put fuel cell growth above the wind and solar trends. **The similarity of fuel cell power growth to past growth in wind and solar power has not been widely recognised.**

Fuel Cell, Solar PV and Wind Turbine annual power generation (MW)



“Wind in 1994 and Solar in 2002 meet Fuel Cells in 2017” *

Source: Electron Communications, www.fuelcellindustryreview.com. *Matthew Klippenstein

Market view: Widespread FCEV adoption is unlikely as a hydrogen refuelling infrastructure is too costly.

Our view: Heavy duty fuel cell trucks and buses, typically depot-based (drayage, city fleets etc.), **will drive short-term platinum demand growth** with the associated hydrogen and refuelling facilities provision able to stimulate and support increased FCEVs.

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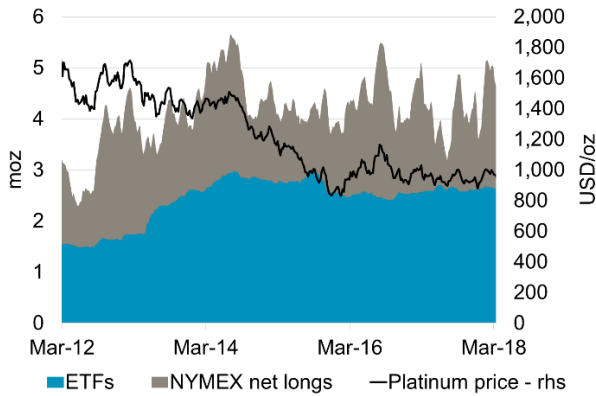
May 2018

Platinum in six charts – May 2018

We believe there are many reasons supporting consideration of platinum as an investment asset:

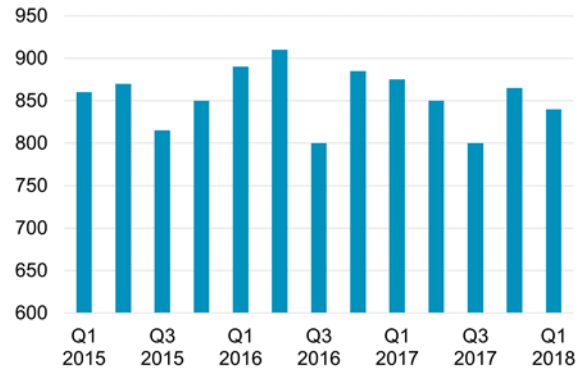
- Supply demand fundamentals are robust and ETF holdings are stable, despite price volatility
- Risks of supply declines are underestimated - cost pressure and falling mining investment continue
- Downside risks to platinum automotive demand are overestimated
- Futures positioning follows sentiment with high correlation to price
- Platinum is undervalued against its past, its production cost, palladium and gold

Figure 1: ETF holdings stable despite price volatility; correlation between futures positioning and price



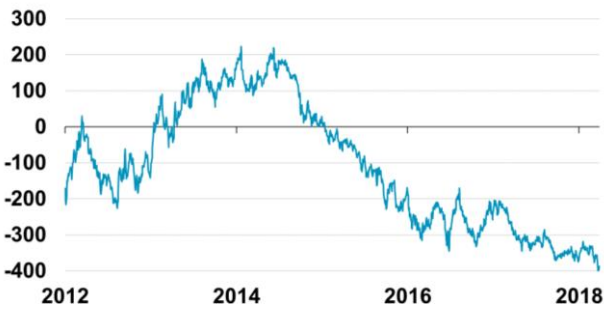
Source: Bloomberg, ETF providers, WPIC Research

Figure 4: Automotive demand being impacted by European diesel share falls (koz)



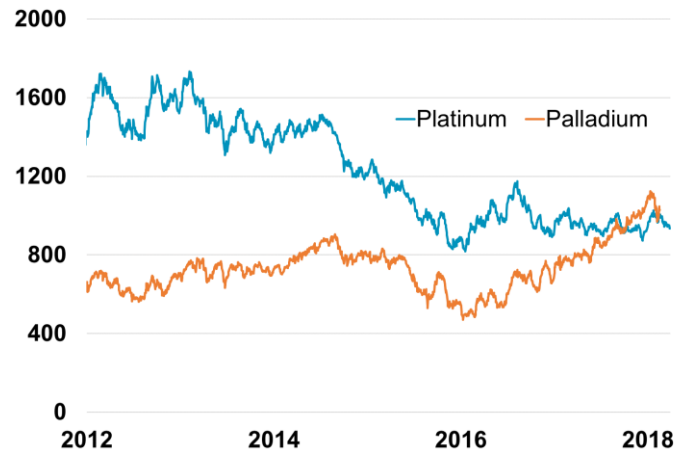
Source: WPIC Platinum Quarterly Q1 2018, SFA (Oxford)

Figure 2: Platinum discount to gold at an all-time high of c\$400/oz



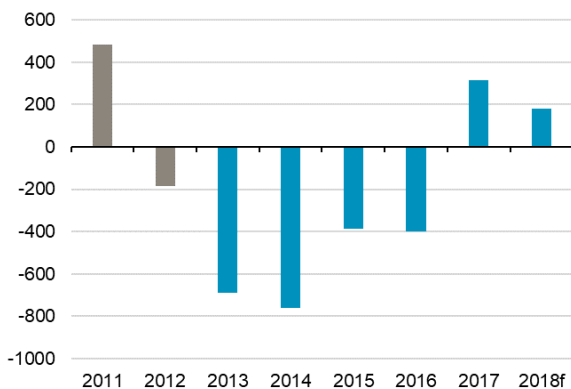
Source: Bloomberg, WPIC research

Figure 5: Platinum substitution for palladium in gasoline catalysts due to price and availability concerns (US\$/oz)



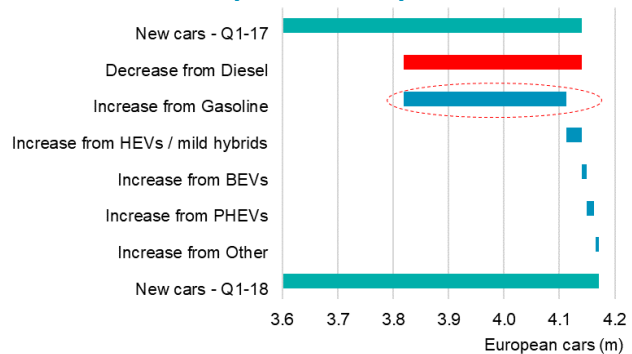
Source: Bloomberg

Figure 3: Platinum supply demand balance (koz)



Source: Johnson Matthey, WPIC Platinum Quarterly Q4 2017, SFA (Oxford)

Figure 6: Diesel vehicles lost continue to be replaced by gasoline more than hybrid or battery vehicles



Source: LMC, ACEA, WPIC research.

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