



# 2. PGM market outlook: our perspective

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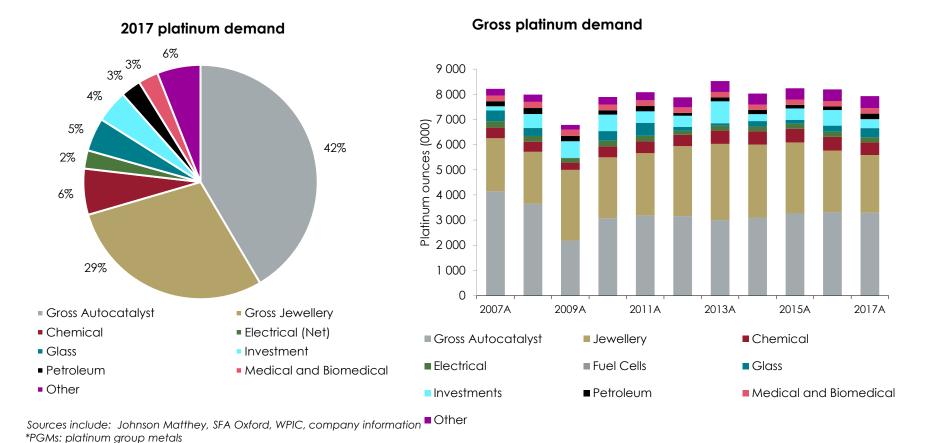


Sibanye-Stillwater PGM demand outlook

# Platinum: the most functional precious metal



- Gross platinum demand remains industrial biased
  - autocatalysts: 42% of platinum demand
  - industrial applications: 29%, with demand largely driven by global growth
  - platinum jewellery: 29% of total demand



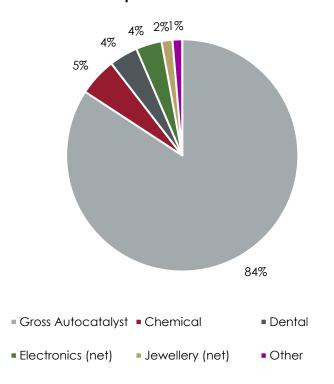
There is more to PGMs\* than autocatalysts

# Palladium is largely an auto story

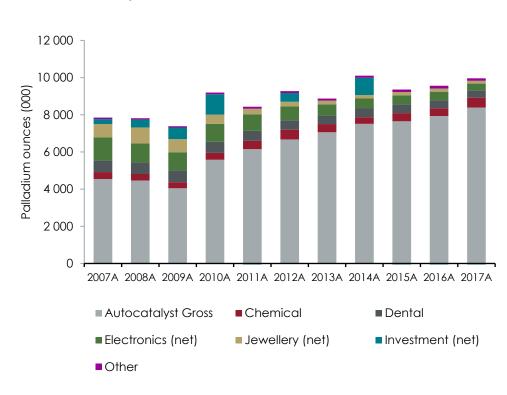


- Palladium continues to have a much higher exposure to auto demand growth, given its primary use in gasoline autocatalysts
  - gross autocatalyst demand accounted for 84% of total palladium demand in 2017
  - other industrial demand components accounted for c.13% of total demand

#### 2017 palladium demand



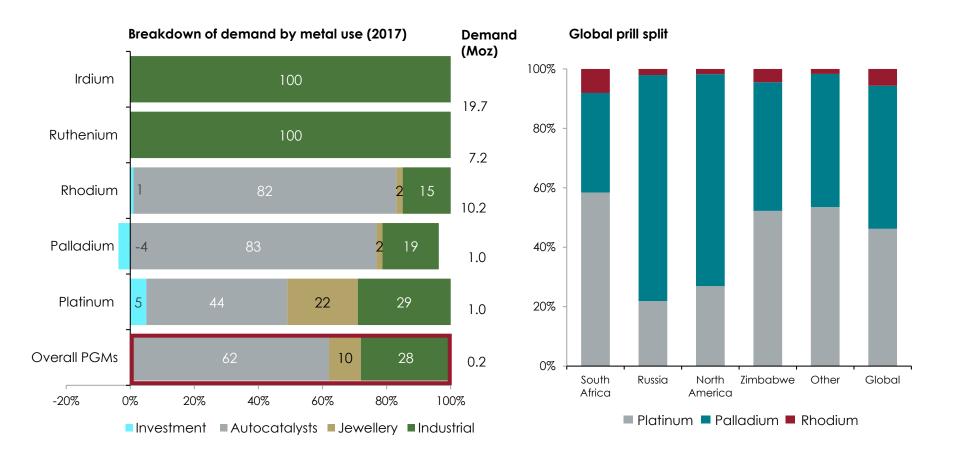
#### Gross palladium demand



Sources include: Johnson Matthey, SFA Oxford, WPIC, company information

## PGMs are a 'basket'



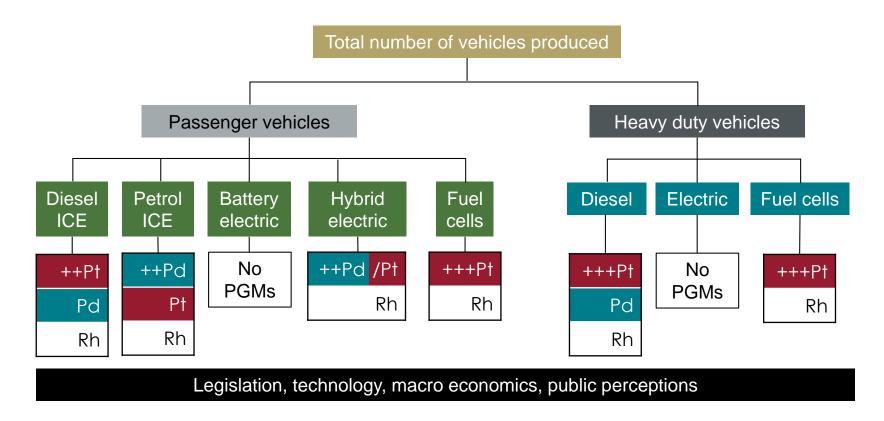


Sources include: Johnson Matthey, SFA Oxford, WPIC, company information

### **Automobiles and PGMs**



- Vehicle growth is expected to increase at a global CAGR of 2.1% over the next 10 years
- By 2024, the light duty vehicle car park is expected to grow to 106 million vehicles from 92 million vehicles in 2017
- By 2024, the heavy duty vehicle car park is expected to grow to 6 million vehicles from 5.4 million in 2017

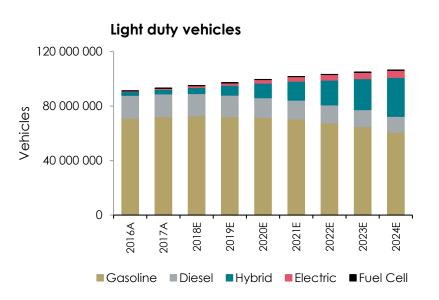


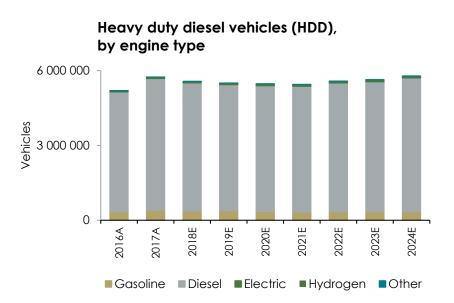
Sources include: Johnson Matthey, SFA Oxford, WPIC, company information

#### The diesel debate



- Global warming versus human health
- Technology likely to close gap between diesel and gasoline CO<sub>2</sub> emissions and diesel and petrol NOx emissions
- Total cost of ownership of diesel still better
  - fleet light duty diesel (LDD) accounts for 72% of total diesel LDD purchases in the EU
- Average 0.4g CO<sub>2</sub>/km increase of 2017 new vehicle fleet in Europe compared to 2016 (118.5 vs 118.1 in 2016) owes to reduced diesel share
- We forecast by 2024 global ICE diesel market share decrease to 10% (from 18%), gasoline to 56% (from 78%) and the balance electric vehicles





Sources include: Johnson Matthey, SFA, BASF, company forecasts

## The outlook for BEVs is euphoric

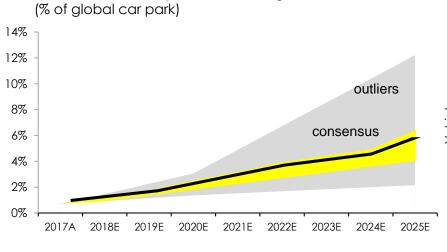


Indexed to May 2017 deposits (=100)

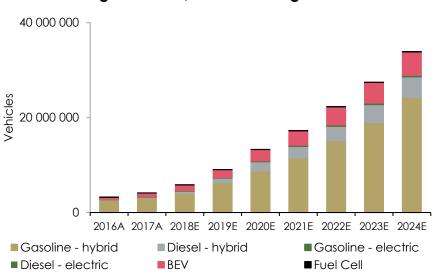
- The outlook for battery electric vehicles (BEVs) is mixed and the spread of BEV penetration forecasts is extreme
  - outlier BEV penetration estimates range from 2% to 11% by 2025E
- Electric vehicle (EV) and BEV assumptions underpinning our PGM models are aggressive
  - 33% EV penetration rate expected globally by 2025E, with BEVs increasing global market share to 6%



#### Outlier broker BEV penetration range



#### Light vehicles, new technologies

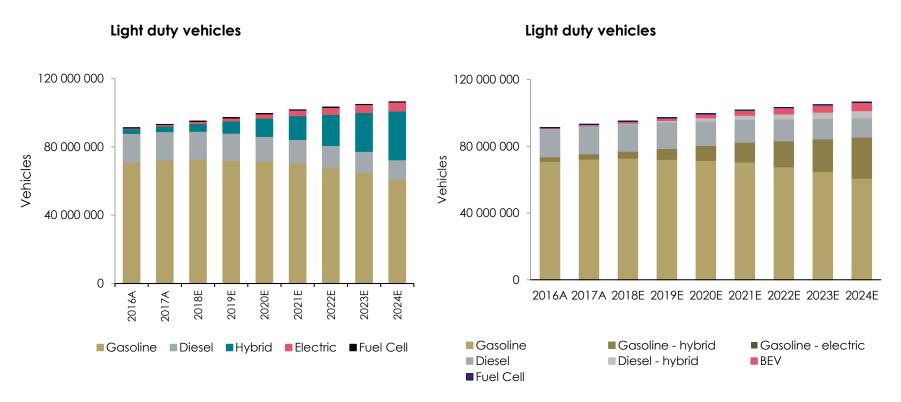


Sources include: Johnson Matthey, SFA, BASF, company forecasts

# What does this actually mean



- Hybrid vehicles are at worst neutral, and possibly positive for PGMs
- Gasoline vehicles CAGR = 1.9% (+10.4m vehicles in 2024 compared to 2017)
- Diesel vehicles CAGR = -0.8% (-0.95m vehicles in 2024 compared to 2017)
- BEV CAGR = 33.9% (+4.3m vehicles in 2024 compared to 2017)



Sources include: Autofacts, Johnson Matthey, SFA, BASF, company forecasts

#### **Fuel cells**



- Electrification of vehicle power train to include a range of hybrids, batteries and fuel cells
- Batteries are a good supplier of power but a weak store of energy while hydrogen tanks are a weak source of power but a good store of energy
  - Nissan Leaf (BEV): 110kW and 151 miles\*
  - Toyota Mirai (FEC): 114kW and 312 miles\*
  - Tesla Model S (BEV): 311kW and 303 miles\*
- Fuel cell vehicles to be included in electrification mix
- Initial penetration to come from depot-structured filling infrastructure

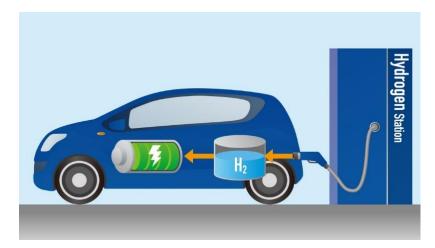


Fuel cell technology is an integral part of our powertrain strategy. The advantages are very clear to us: zero emissions, long ranges and short tanking times...

Christian Mohrdieck, Daimler's Fuel Cell Director

We believe fuel-cell vehicles remain the ultimate type of zero-emission vehicle.

Honda CEO Takahiro Hachigo (June 2017)



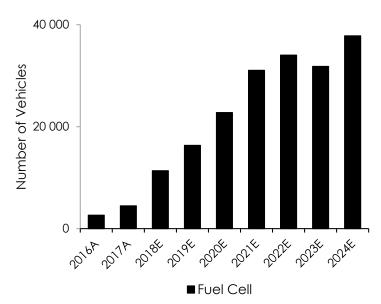
\*Johnson Matthey

## Fuel cells: China road map



- Chinese government roadmap the deployment of fuel cell vehicles
  - 5,000 units (40% passenger cars) by 2020 and 100 hydrogen stations
  - 50,000 units by 2025 (80% passenger cars) and 300 hydrogen stations
  - 1 million units by 2030 and 1,000 hydrogen stations
- Japanese government's targets for fuel cell vehicles:
  - 40,000 units by 2020
  - 200,000 units by 2025
  - 800,000 units by 2030
- At 10g/ton, 5 million fuel cell vehicles (<5% total market share) will consume the same amount of platinum as LDD vehicles in Europe in 2017
- Despite these plans, our modelled fuel cell penetration rates are conservative

#### Fuel cell light vehicles





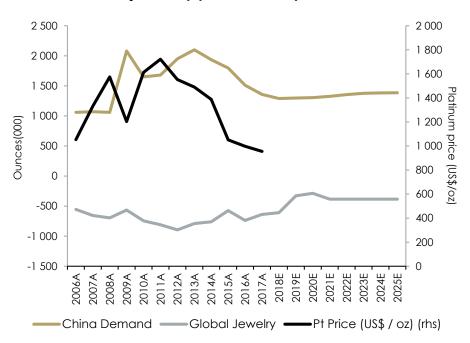
Sources include: Autofacts, Johnson Matthey, SFA, BASF, company forecasts

# Platinum jewellery – demand forecast

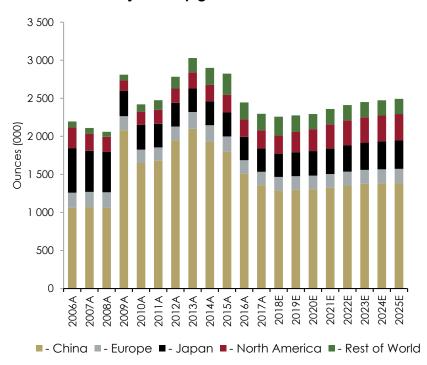


- Historically, jewellery has been a "shock absorber" to platinum demand
- However, since 2013 jewellery and investment buying have been more consistently cyclical

#### Platinum jewellery price elasticity



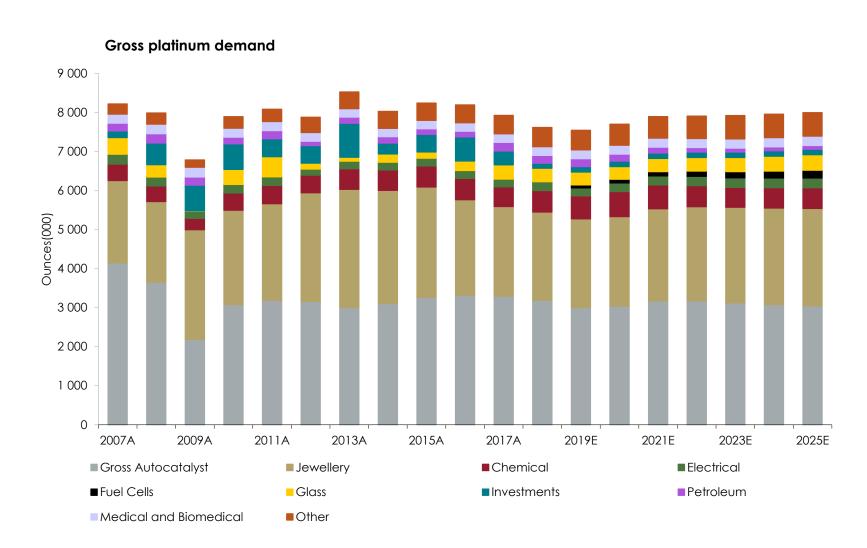
#### Platinum jewellery gross demand



Source: Johnson Matthey, SFA Oxford, PGI, company estimates

## Platinum – demand forecast



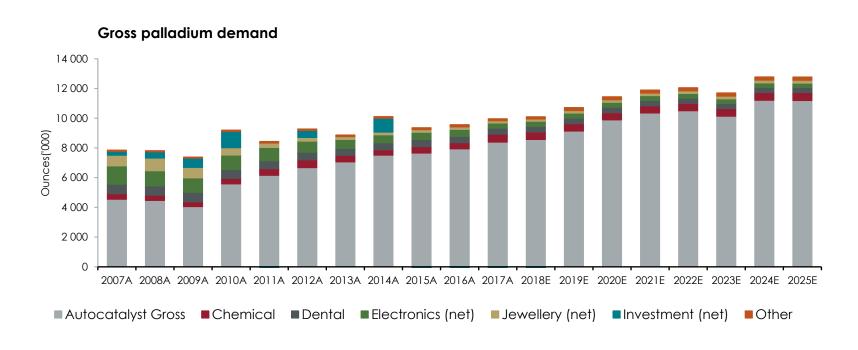


Source: Johnson Matthey, SFA Oxford, WPIC, company estimates

## Palladium – demand forecast



- Gasoline expected to maintain majority share of global auto market to 2025
- Legislative and technological trends reinforcing outlook for steady, continued demand for palladium
- Industrial sector demand expected to remain flat at best on the back of anticipated palladium price resilience
- Jewellery demand expected to contract further due to increased price pressure and limited market development



Source: Johnson Matthey, SFA Oxford, WPIC, company estimates



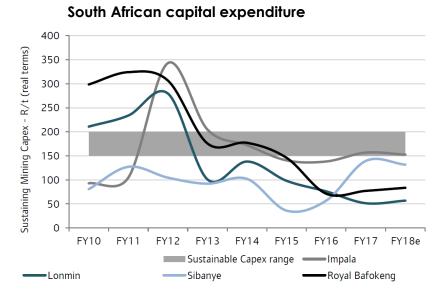


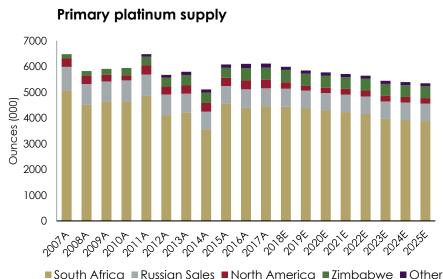
Sibanye-Stillwater PGM supply outlook

# Platinum – primary supply



- Capital underinvestment by South African PGM producers (c.70% of global primary platinum supply) since 2008 global financial crisis
  - insufficient to replace current production levels
- Without incentive-driven price growth, new supply coming on-stream seems unlikely or delayed
  - South African primary production expected to decline by 13% by 2025 (-1.5% CAGR)
- No new production expected from the western limb without a real basket price escalation exceeding 20-25%.
  - western limb represents more than 70% of South African supply



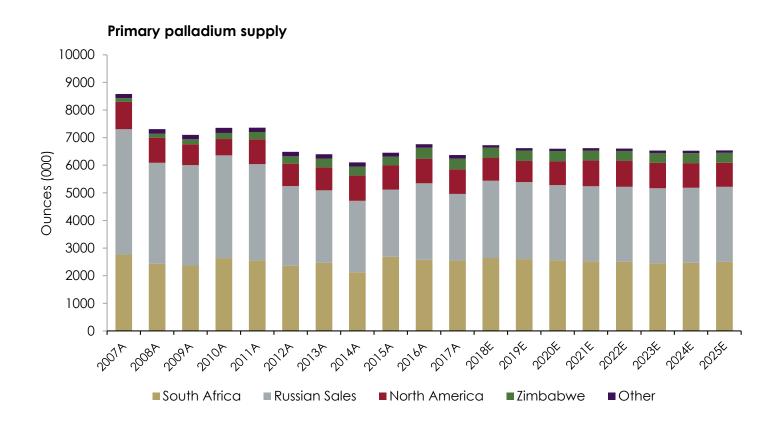


Sources: SBG Securities and Johnson Matthey, SFA Oxford, company estimates

# Palladium – primary supply



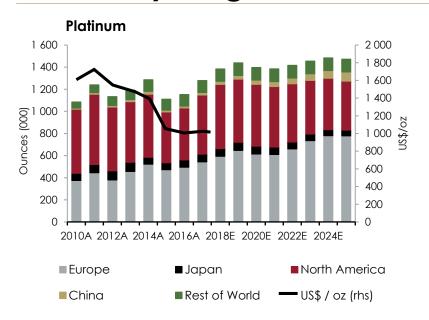
- Supply expected to decline over forecast period on the back of a decline in South African production
- Russian and North American supply expected to remain stable

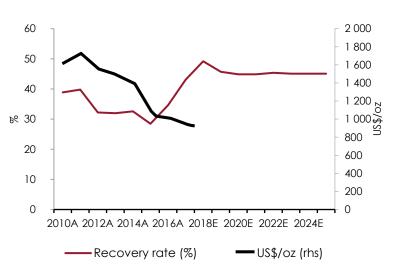


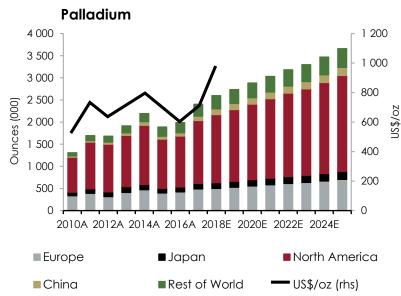
Source: Johnson Matthey, SFA Oxford, WPIC, company estimates

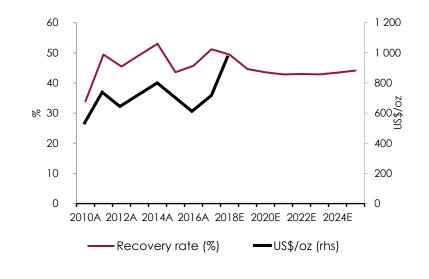
# PGM recycling – secondary supply







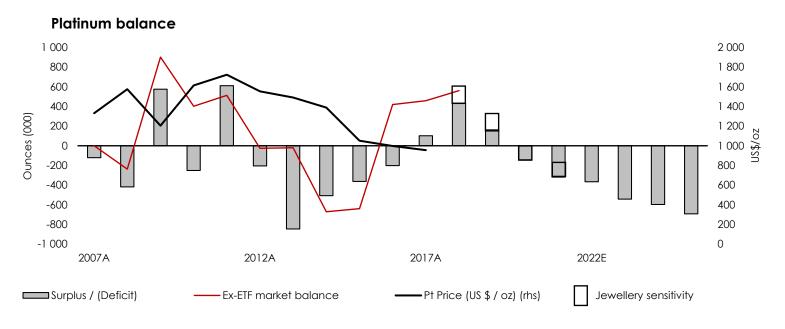




# Platinum – supply deficit on the horizon



- Despite ongoing diesel and EV concerns, platinum's fundamentals remain robust
  - limited primary and secondary supply growth anticipated globally
  - significant producer capital underinvestment has resulted in long-term South Africa primary producer supply instability
  - demand is well supported, even in weakening diesel markets
- Platinum likely to be marginally in surplus for the remainder of this decade, thereafter reverting to material deficit as primary production from South Africa contracts

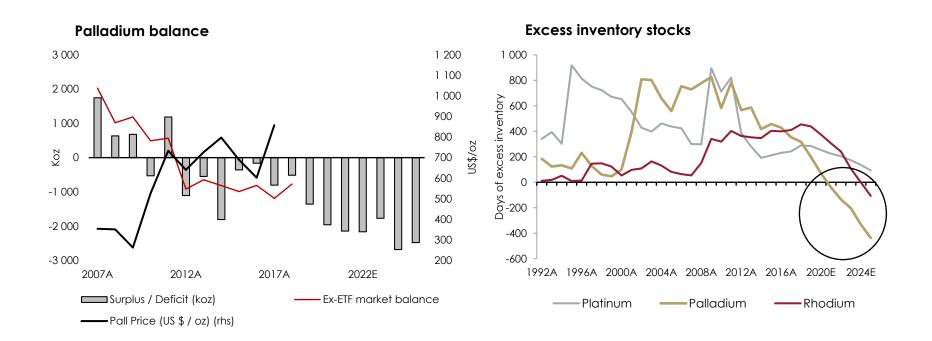


Source: Internal demand and supply model based on WPIC information, broker consensus and other sources

# Palladium – becoming the most precious PGM?



- Palladium set for sustained deficits
  - excess inventories already closing in on normalised levels
  - gasoline vehicles expected to maintain a majority market share to 2025 and to increase in absolute numbers including gasoline hybrids
  - primary supply to remain largely stable, to marginal decline
  - excess palladium inventories forecast by Sibanye-Stillwater to reduce to nil by 2021

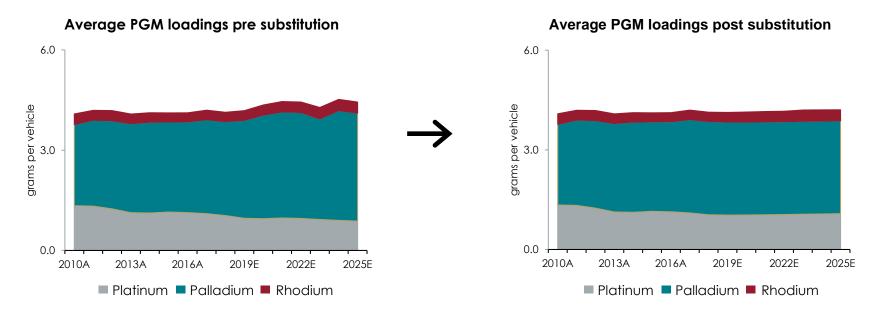


Source: Internal demand and supply model based on WPIC information, broker consensus and other sources

# Substitution – from palladium to platinum



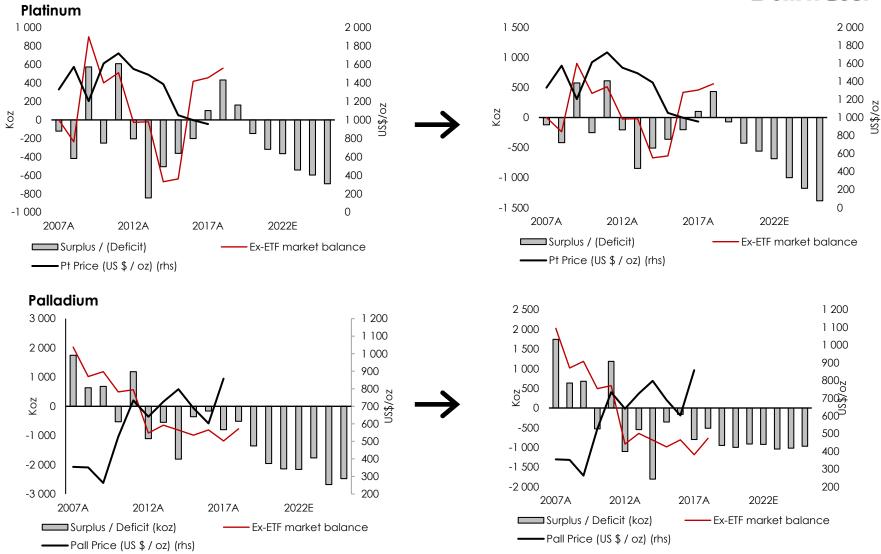
- We believe that it is inevitable that there will be substitution from palladium to platinum
- In our view, significant substitution unlikely in the short term (< two three years)</li>
  - Requires sustained (c.400 \$/oz) price gap...(OEM)
  - several years to develop, implement and licence...(OEM)
  - Fabricators suggest technically feasible but timeous.....
- Recyclers claim to be seeing substitution already occurring in after market exhaust systems
- Our assumptions are modelled on substitution trends observed in 1990s
- Substitution reduces platinum's sensitivity to diesel



Source: Johnson Matthey, SFA Oxford, company estimates

## Substitution means better overall balance



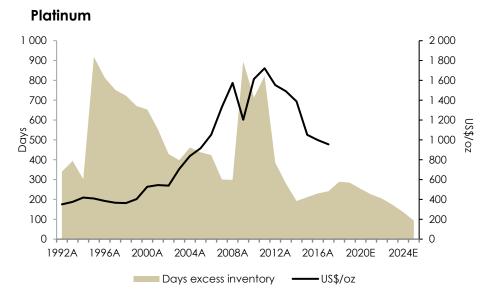


Source: Internal demand and supply model based on WPIC information, broker consensus and other sources

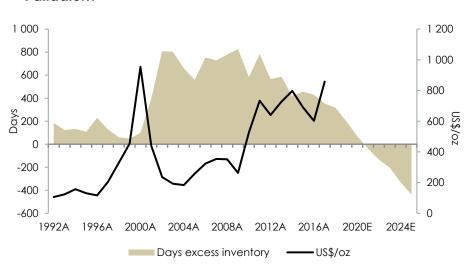
## **Excess inventories**



- A review of cumulative stocks since 1974 confirms material palladium deficits
- Market is unsustainable as is and requires investment to drive supply
- Balancing the PGM basket is critical for a sustainable market



#### **Palladium**



Source: Johnson Matthey, Sibanye-Stillwater (2018)
\* Investment stock treated as a stock movement

## Conclusion



- Platinum demand expected to be stable while primary supply is under threat
  - Supply driven deficits are expected in the next three years
  - Basket price increases of more than 25% required to incentivise South African supply growth
- Palladium demand will continue to increase underpinned by robust growth in gasoline market
  - Sustained and material market deficits continue to be forecast
- Substitution across the PGM's appears inevitable, but unlikely to occur on a material scale in next three years
- Power trains will continue to evolve and comprise a mix of technologies over the long term, including fuel cells
- PGM markets need to be strategically managed as a "basket" and Sibanye-Stillwater is ideally positioned to deliver into changing demand cycles

