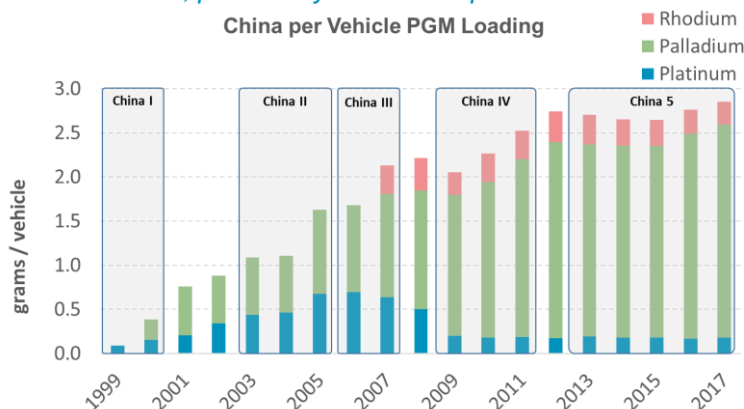


## China clean air, PGMs and platinum

**China's new auto emissions standards are likely to boost PGM demand.** China's 6a and 6b standards, to be fully implemented by 2020 and 2023, respectively, represent a significant tightening of emissions requirements (see Figure 1 next page). The new standards are more stringent than Euro 6 as they introduce elements of US regulation, e.g., enhanced on-board diagnostic provisions. Unlike European regulation, China 6 does not differentiate between diesel and gasoline vehicles, establishing a single standard for both. Real driving emissions (RDE) tests are also being introduced to ensure that cars on the road deliver similar emissions results to those in the lab. The step up in standards means that manufacturers will need to improve their emissions technology which should have a positive impact on platinum group metal (PGM) content, as we have seen in the past (left hand graph below).

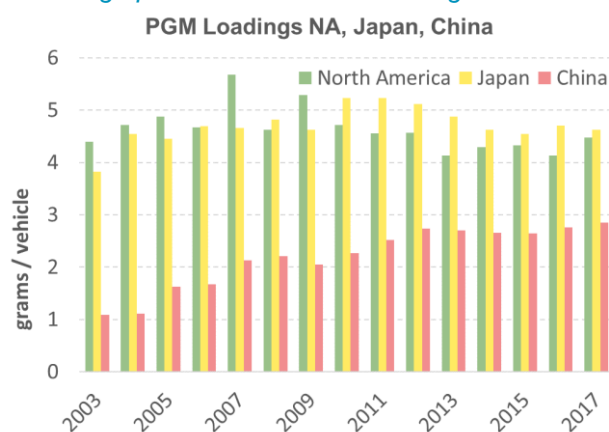
**6a implementation by July 2020, however, Beijing and other regions tend to adopt early.** While final implementation of 6a is not until mid-2020, several important municipalities tend to adopt more stringent emissions standards early. Beijing and other built-up regions have consistently adopted the more restrictive rules as much as several years early (see Figure 1 incl. footnote). In the left-hand graph below, we see PGM loadings often increase with a new regulation implementation, likely due to early implementation by Beijing and others, and then again later as all-China implementation is reached.

*China vehicle loadings have increased in step with new emissions rules, particularly as final adoption occurs*



Note: Shaded areas represent implementation periods starting with early adopters (e.g., Beijing) and final implementation for all of China.  
Source: OICA, Johnson Matthey, ICCT, WPIC Research

*China loadings lag NA and Japan by over 36%, indicating upside as emissions rules tighten*



Source: OICA, WPIC Research

**China has some way to catch up with PGM loadings in more mature markets.** The right-hand graph above shows PGM loadings per vehicle in North America, Japan and China. Several factors explain the differences including average engine size, fuel mix differences (thus excluding Europe), and, most importantly, emissions standards. Nonetheless, as emissions standards and wealth improve in China, PGM loadings should continue to approach those of more developed regions, thus providing a demand push for PGMs, including platinum, by potentially as much as a gram per vehicle.

**As palladium goes further into deficit, it should tighten the platinum market.** The Chinese demand trend is significant as it represents 26% of global PGM demand. Should Chinese automakers see supply risk and/or cost disadvantage in palladium, the platinum market offers ample capacity to satisfy increased PGM demand. For some additional views on potential platinum substitution for palladium, see our [October Platinum Perspectives](#).

Trevor Raymond  
Director of Research  
+44 203 696 8772

[traymond@platinuminvestment.com](mailto:traymond@platinuminvestment.com)

C. Nicolaj Sebrell, CFA  
Manager, Investment Research  
+44 203 696 8781

[nsebrell@platinuminvestment.com](mailto:nsebrell@platinuminvestment.com)

World Platinum Investment Council  
[www.platinuminvestment.com](http://www.platinuminvestment.com)  
64 St James's Street  
London SW1A 1NF

November 2018

# Platinum charts – November 2018

Platinum's attraction as an investment asset arises from:

- Supply is relatively constrained, with limited investment going into new PGM mines
- Automotive demand shows promise with tighter emissions regulation and potential palladium substitution
- Platinum appears undervalued relative to palladium and gold
- Managed money positioning looks to be improving

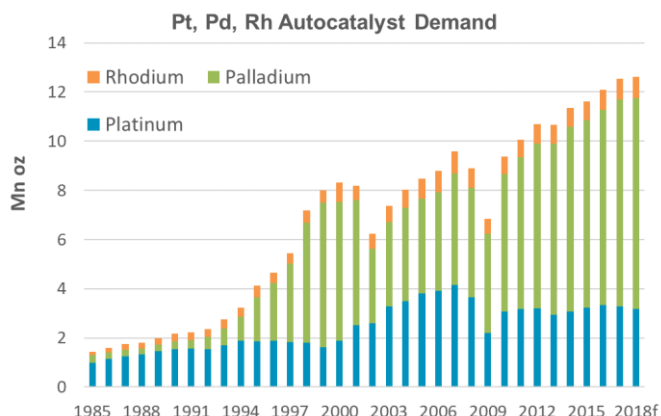
Figure 1: China 6 is a significant step-up in standards; Beijing and other provinces adopt early

China Emissions Regulation History			Type 1 Standards g/km				
	Adoption*		CO	HC	NMHC	NOx	PM
	Early Adopters	All China					
China 1	Jan-1999	Jul-2000	2.72	-	-	-	-
China 2	Jan-2003	Jul-2005	2.2	-	-	-	-
China 3	Dec-2005	Jul-2007	2.3	0.20	-	0.150	-
China 4	Dec-2008	Jul-2011	1.0	0.10	-	0.080	-
China 5 <sup>‡</sup>	Feb-2013**	Jan-2018	1.0	0.10	0.068	0.060	0.0045
China 6a <sup>‡</sup>	†	Jul-2020	0.7	0.10	0.068	0.06	0.0045
China 6b <sup>‡</sup>	†	Jul-2023	0.5	0.05	0.035	0.035	0.0030

\* adoption dates are for Type 1 LDVs below 2.5 t.  
 \*\* Beijing adopted "Beijing 5" as China 5 standards were not yet official.  
 † In 2016, Beijing proposed adopting an early version of China 6 by 2017, but did not go forward once China 6 was published.  
 ‡ China 6a and 6b include a N<sub>2</sub>O 0.02 g/km limit; China 5, 6a and 6b include a PN 6x10<sup>11</sup> limit.  
 CO = carbon monoxide; HC = hydrocarbons; NMHC = non-methane hydrocarbons;  
 NOx = nitrogen oxides; PM = particulate matter; PN = particulate number.

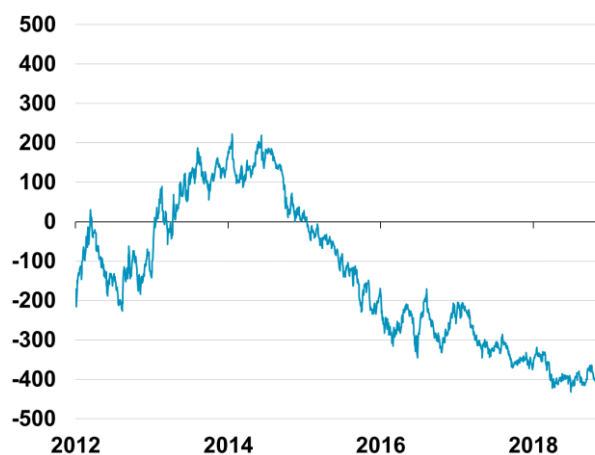
Source: ICCT, China MEP, WPIC Research

Figure 3: The auto market has become heavily reliant on palladium ...



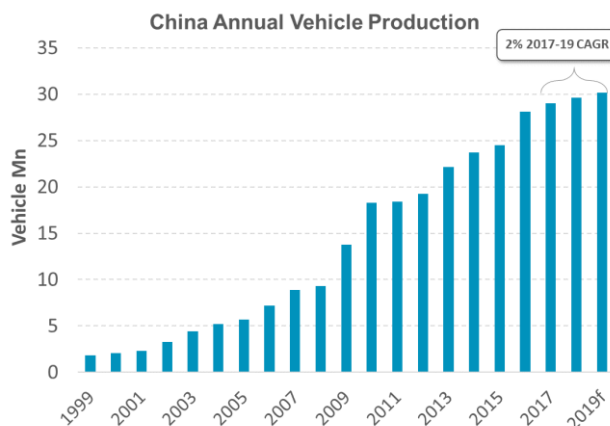
Source: Johnson Matthey, WPIC Research

Figure 5: Platinum's \$370/oz discount to gold is near an all-time high



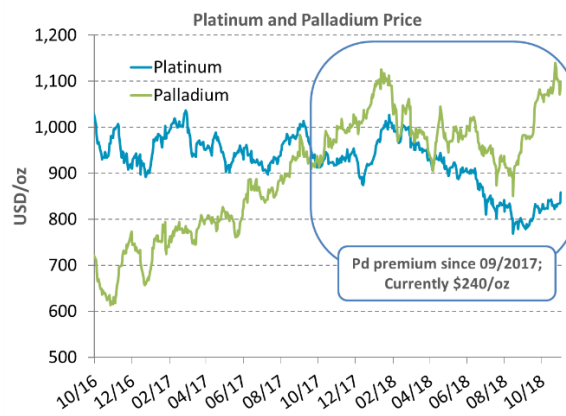
Source: Bloomberg, WPIC Research

Figure 2: China production growth continues despite a potentially challenging international environment



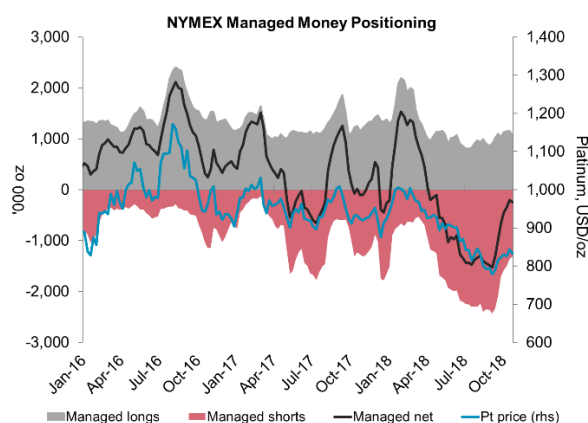
Source: OICA, WPIC Research

Figure 4: ... resulting in the significant palladium price premium over platinum seen today



Source: Bloomberg, WPIC Research

Figure 6: NYMEX net positioning has improved



Source: Bloomberg, WPIC Research

*IMPORTANT NOTICE AND DISCLAIMER: This publication is general and solely for educational purposes. The publisher, The World Platinum Investment Council, has been formed by the world's leading platinum producers to develop the market for platinum investment demand. Its mission is to stimulate investor demand for physical platinum through both actionable insights and targeted development: providing investors with the information to support informed decisions regarding platinum; working with financial institutions and market participants to develop products and channels that investors need.*

*This publication is not, and should not be construed to be, an offer to sell or a solicitation of an offer to buy any security. With this publication, the publisher does not intend to transmit any order for, arrange for, advise on, act as agent in relation to, or otherwise facilitate any transaction involving securities or commodities regardless of whether such are otherwise referenced in it. This publication is not intended to provide tax, legal, or investment advice and nothing in it should be construed as a recommendation to buy, sell, or hold any investment or security or to engage in any investment strategy or transaction. The publisher is not, and does not purport to be, a broker-dealer, a registered investment advisor, or otherwise registered under the laws of the United States or the United Kingdom, including under the Financial Services and Markets Act 2000 or Senior Managers and Certifications Regime or by the Financial Conduct Authority.*

*This publication is not, and should not be construed to be, personalized investment advice directed to or appropriate for any particular investor. Any investment should be made only after consulting a professional investment advisor. You are solely responsible for determining whether any investment, investment strategy, security or related transaction is appropriate for you based on your investment objectives, financial circumstances and risk tolerance. You should consult your business, legal, tax or accounting advisors regarding your specific business, legal or tax situation or circumstances.*

*The information on which this publication is based is believed to be reliable. Nevertheless, the publisher cannot guarantee the accuracy or completeness of the information. This publication contains forward-looking statements, including statements regarding expected continual growth of the industry. The publisher notes that statements contained in the publication that look forward in time, which include everything other than historical information, involve risks and uncertainties that may affect actual results. The logos, services marks and trademarks of the World Platinum Investment Council are owned exclusively by it. All other trademarks used in this publication are the property of their respective trademark holders. The publisher is not affiliated, connected, or associated with, and is not sponsored, approved, or originated by, the trademark holders unless otherwise stated. No claim is made by the publisher to any rights in any third-party trademarks*

#### *WPIC Research MiFID II Status*

*The World Platinum Investment Council (WPIC) has undertaken an internal and external review of its content and services for MiFID II. As a result WPIC highlights the following to the recipients of its research services, and their Compliance/Legal departments:*

*WPIC research content falls clearly within the Minor Non-Monetary Benefit Category, and can continue to be consumed by all asset managers free of charge. WPIC research can be freely shared across investment organisations.*

- 1. WPIC does not conduct any financial instrument execution business. WPIC does not have any market making, sales trading, trading or share dealing activity. (No possible inducement).*
- 2. WPIC content is disseminated widely and made available to all interested parties through a range of different channels, therefore qualifying as a "Minor Non-Monetary Benefit" under MiFID II (ESMA/FCA/AMF). WPIC research is made freely available through the WPIC website. WPIC does not have any permissioning requirements on research aggregation platforms.*
- 3. WPIC does not, and will not seek, any payment from consumers of our research services. WPIC makes it clear to institutional investors that it does not seek payment from them for our freely available content.*

*More detailed information is available on the WPIC website:*

*<http://www.platinuminvestment.com/investment-research/mifid-ii>*