

# Auto Propulsion Technologies and Metals Russian and Chinese Global Perceptions



CPM Group

MacroVoices  
5 February 2019

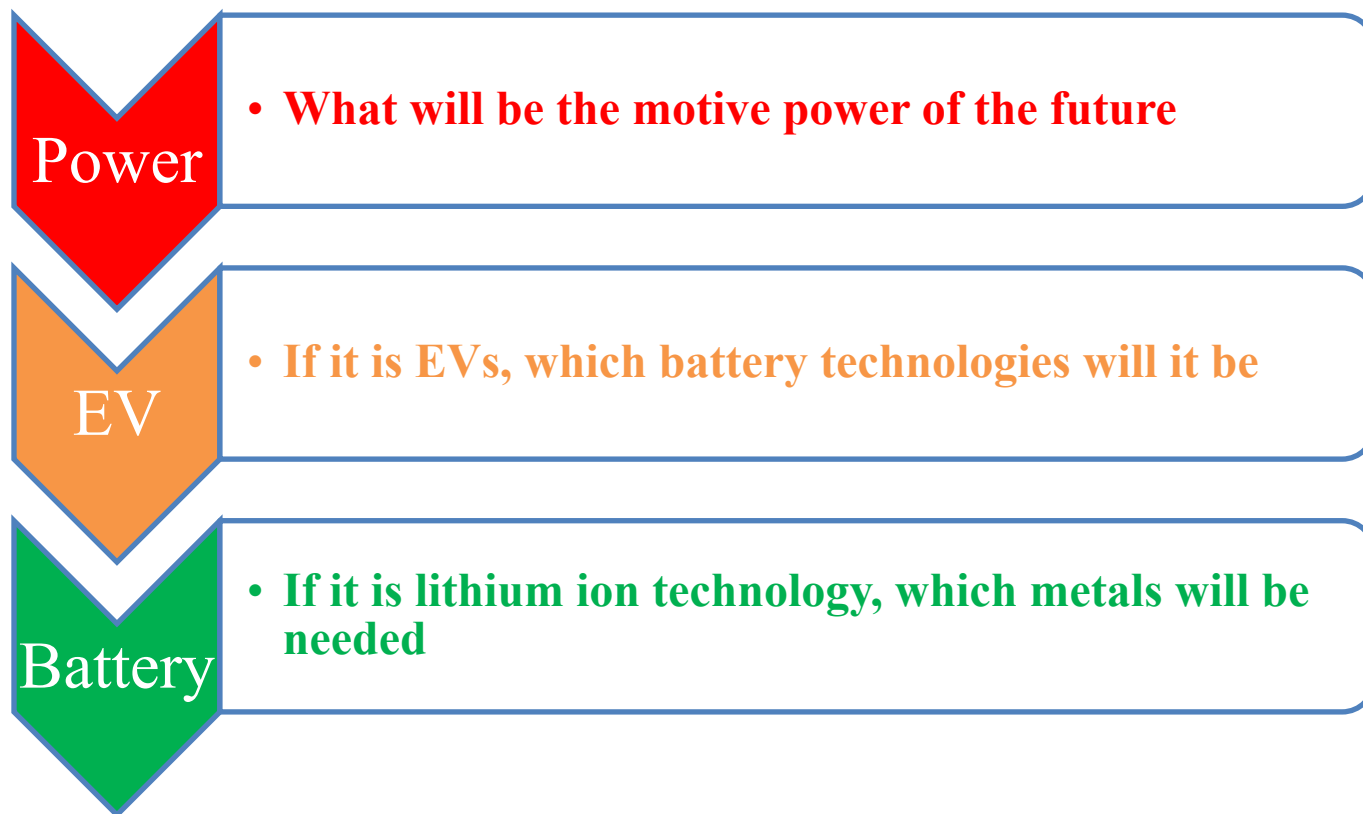
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# **Auto Propulsion Technologies and Metals**

# Future Of Motive Power: Hierarchy of Uncertainties

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There is an enormous degree of uncertainty surrounding what will be the future automotive propulsion system of choice, or whether they may be a mix of technologies.



# What will be the motive power of the future?

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Gasoline

Diesel

Compressed Natural Gas

Hybrid Vehicles

Electric Vehicles

Plug-in Hybrid Vehicles

Fuel Cells

**Hydrogen Engines**



# Auto Propulsion Changes Are A Long-Term Threat

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## PGM Use in Auto Catalysts

Pd vs Pt: It's coming now. The next two years will see major shifts

ICEs vs EVs: The shift to EVs will take decades, not years

- Lack of electricity, distribution, manufacturing capacity
  - The auto OEM need decades and billions of capital to build capacity
  - There will not be enough electricity to meet EV requirements for decades
  - The grid operations are too unstable and insufficient in almost every country in the world and will need billions in upgrades to meet EV needs
- Not foreordained
- By 2050 probably 65% - 70% of vehicles still will use petroleum and PGMs

HEVs In EV clothing come first.

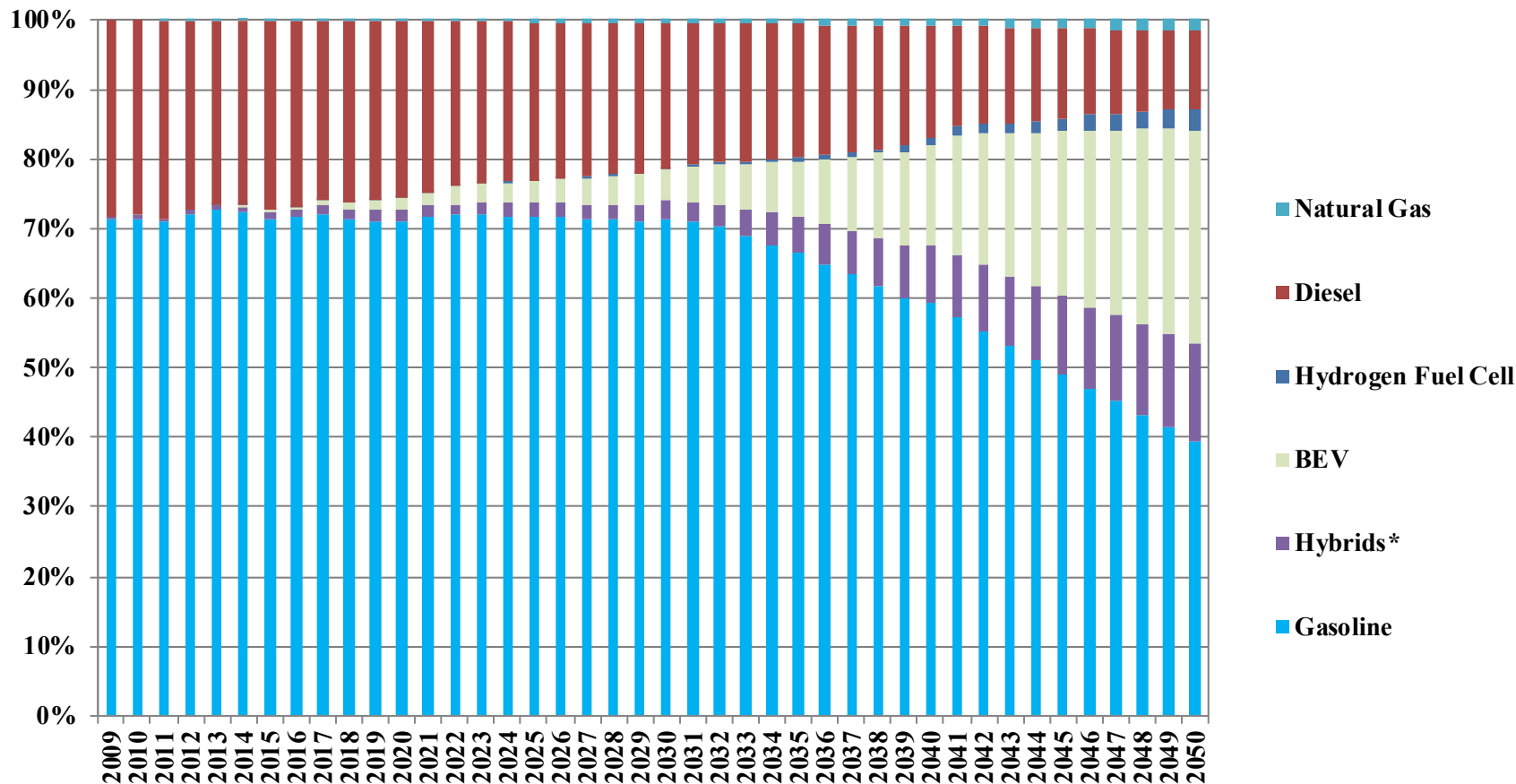


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# Market Share By Engine Type: It's A Long-Term Shift

## Scenario 4: Global Vehicle Market Share By Engine Type

*Annual Data, Projected Through 2050*



# Hydrogen and Fuel Cells

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There are two key approaches toward using hydrogen in motive power.

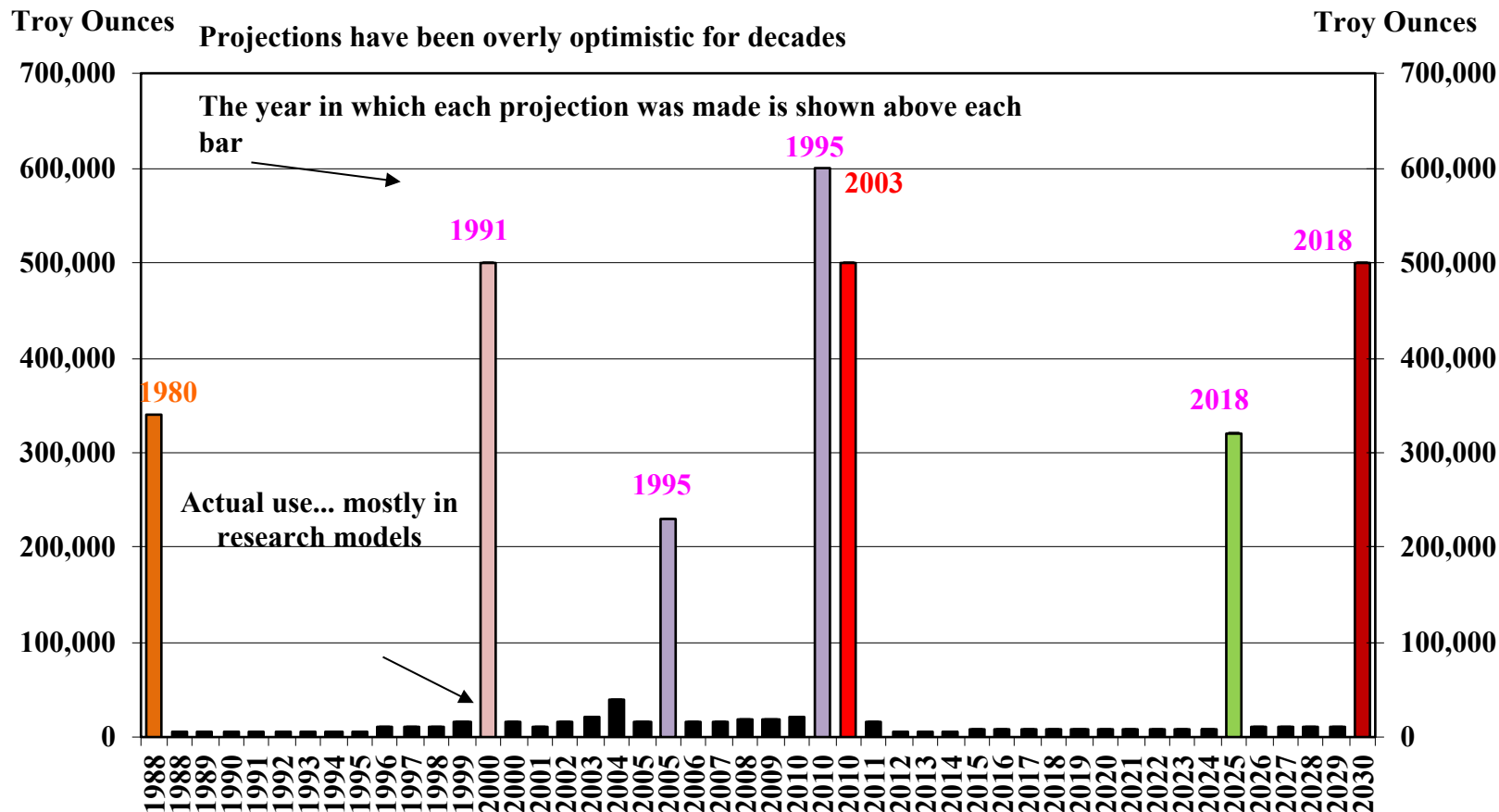
1. Fuel cells
2. Hydrogen Engines

Regardless of how you use it, you still have all of the issues of costs and safety in getting hydrogen to users, shipping, storing, distributing and using it.

You also have issues of the sources and production costs for hydrogen.

# Platinum In Fuel Cells

## Projections of Future Platinum Use in Fuel Cells -- Always Optimistic





# Fuel Cells

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## Fuel Cells

1. Are not technically viable, still.
2. Are not economically or financially viable.
3. The stacks need to last five years for these to be economic.
  - a) The stacks tend to last less than one year.
4. There are issues about where you get the hydrogen
  - a) If you get it from petroleum products or natural gas, you are not solving the carbon emission problems.

# Fuel Cells Will Not Save South Africa PGM Producers

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Fuel cells have been commercialized, but:

- They need constant maintenance, are expensive, and scare C-Level executives that are using fleets and their insurance companies and lawyers.
- Fuel cells will remain too costly and technically inefficient.
- **And, they no longer need to use platinum.**

# Safe and Affordable Hydrogen Not A Fuel Cell Cure

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**If You Get Hydrogen Distribution Safe and Affordable The Auto Industry Goes to Hydrogen Engines**

<b>Hydrogen ICEs</b>	<b>\$1,500 manufacturing cost, reduced operating costs</b>
Petroleum ICEs	\$3,000
Electric Battery Pack	\$10,000
Fuel Cell Stack	\$30,000, high operating costs, high maintenance, no Pt

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# **Russian and Chinese Global Perceptions**

# What Was Old Will Be New Again, At Least With China

## Major World Economies: Share of Global Gross Domestic Product

	<u>2008</u>		<u>2030</u>		<u>1820</u>	
	<u>Rank</u>	<u>Percent of Total</u>	<u>Rank</u>	<u>Percent of Total</u>	<u>Rank</u>	<u>Percent of Total</u>
<b>China</b>	3	6.3%	2	15.5%	1	32.9%
<b>India</b>	11	2.0%	5	4.2%	2	16.0%
<b>France</b>	6	4.6%	7	3.3%	3	5.5%
<b>Russia</b>	12	1.9%	9	2.4%	4	5.4%
<b>United Kingdom</b>	5	4.8%	6	3.7%	5	5.2%
<b>Germany</b>	4	6.1%	4	4.3%	6	3.8%
<b>Italy</b>	7	3.6%	10	2.3%	7	3.2%
<b>Japan</b>	2	9.1%	3	5.2%	8	3.0%
<b>Spain</b>	9	2.5%	12	1.8%	9	1.9%
<b>United States</b>	1	26.7%	1	22.8%	10	1.8%
<b>Brazil</b>	10	2.3%	8	2.6%	NA	
<b>Canada</b>	8	2.6%	11	2.2%	NA	
<b>Other</b>		27.5%		29.7%		21.3%
<b><i>Subtotal top economies</i></b>		72.5%		70.3%		78.7%

Notes: Adjusted for purchase power parity.

Sources: Angus Maddison's The World Economy (1820); ERS, USDA (2008, 2030)

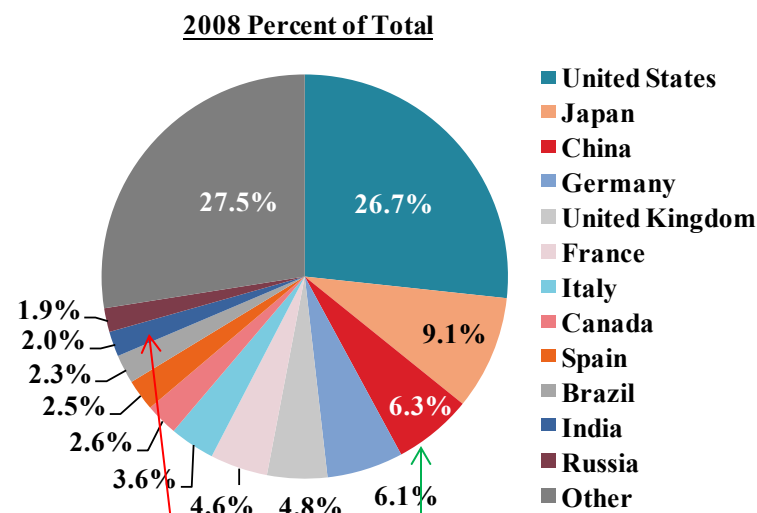


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# First: China and Russia's Places In The World Economy

## Major World Economies: Share of Global Gross Domestic Product

	<u>Rank</u>	<u>2008 Percent of Total</u>
United States	1	26.7%
Japan	2	9.1%
China	3	6.3%
Germany	4	6.1%
United Kingdom	6	4.8%
France	5	4.6%
Italy	7	3.6%
Canada	8	2.6%
Spain	9	2.5%
Brazil	10	2.3%
India	11	2.0%
Russia	12	1.9%
Other		27.5%
<i>Subtotal top economies</i>		72.5%



**Russia is greatly diminished as a world economic power, a point it is painfully aware of.**

**China meanwhile now is second, having surpassed Japan.**

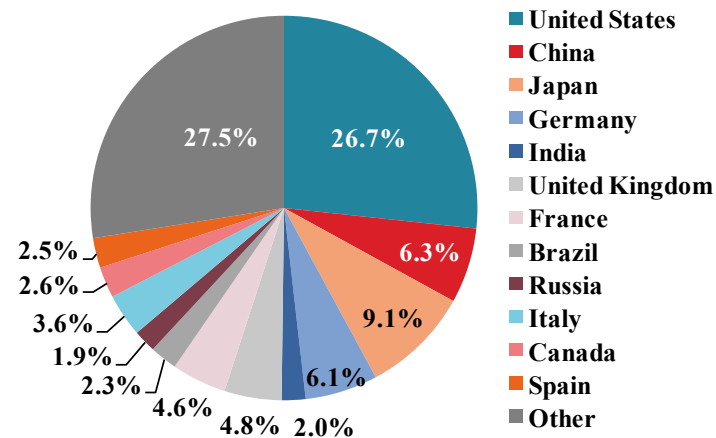
Source: The Economic Research Service of the U.S. Department of Agriculture

# The World Is Changing

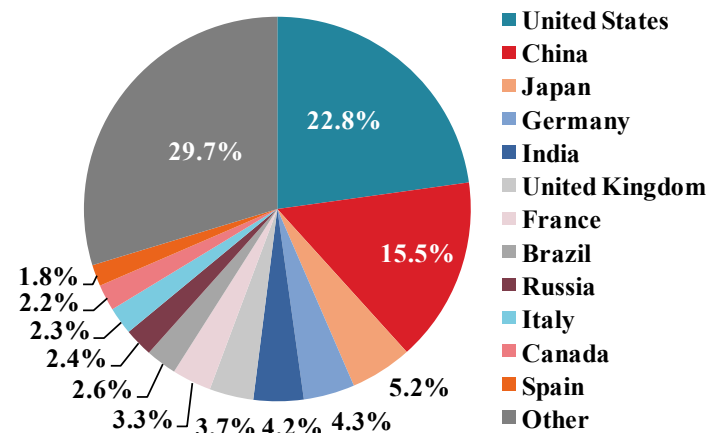
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Other		27.5%		29.7%
<i>Subtotal top economies</i>		72.5%		70.3%

2008 Percent of Total



2030 Percent of Total



Notes: Adjusted for purchasing power parity.

Source: The Economic Research Service of the U.S. Department of Agriculture

# Russian Perceptions of U.S. Aggression

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**U.S. neo-cons have exploited Russian suspicions and concerns consciously, both to further their own agenda and to diminish Russian global power and prestige. They have undertaken policies designed to back Russian leaders into otherwise unfavorable actions.**

**This has fueled Russian collectivism.**

**It has confirmed Russian suspicions of the U.S. government.**

- 1990: The U.S. State Department verbally agreed to limit Nato's eastward expansion to East Germany if Russia approved of German reunification in 1990. Russia complained when Nato expanded all the way up to including former Soviet republics. The U.S. government response was: 'We never agreed to that in writing.'**
- 1992: The Wolfowitz Doctrine leaked. ("Our first objective is to prevent the re-emergence of a new rival, either on the territory of the former Soviet Union or elsewhere.")**
- 1998: Paul Wolfowitz's article.**
- 1999: Richard Cheney's speech at the Royal Institute of Petroleum.**
- 2003: Mikhail Khordokovsky's relations with Cheney and the Duma elections,**

**Anti-Russian U.S. actions actually go back to at least the 1920s and into the 19<sup>th</sup> century.**





# **What “China” Would Like To See**

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**China would like to see a multi-polar world:**

**Economically**

**Monetarily**

**Politically**

**Culturally**

**The Chinese government, and the majority of Chinese citizens according to polls, would like to see a world in which international institutions are balanced to reflect proportionate representation:**

**The United Nations**

**World Bank**

**International Monetary Fund**

**The expectation is that China will assume a position of being first one of the most important countries, nations, and economies in the world, and then ultimately the most important one.**

**It hopes to do so in a peaceful transition in a multi-polar environment.**



# How This Translates Into Policies and Actions

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**“Free trade,” *relatively, in a Chinese Communist definition of it***

**Mutually beneficial trade**

**Avoid colonization**

**Avoid interference in other countries’ domestic affairs, and hope they do not try to interfere with China’s internal matters.**

**Strive for what China wants ...**

**But never be seen as making demands on the world.**

# Implications for Metals Markets

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**Russian and Chinese governmental and private sector investment decisions will be made in a multi-polar global economy with competing forces emanating from many decision-making entities.**

**Russian and Chinese decisions, conditioned by their political cultural heritage, will influence trends in markets, but probably will not dictate trends.**

Gold may play a more important in global financial markets, if not in monetary policies.

Cobalt, lithium, manganese, vanadium, and other metals may experience wild swings in demand and price as technological developments make certain metals critical to new technologies. only to find themselves engineered out of key products and industrial applications shortly thereafter.

Major base metals markets such as copper, nickel, lead, and zinc may find their fortunes buffeted wildly by changing technologies as well as shifts in the global economic, financial, monetary, and political balances.



# Research-Driven Research and Consulting

## Thank You.

### CPM Group Precious Metals Advisory

Vol. XXVIII, No. 9 ■ 3 September 2015

Next Scheduled Issue: 8 October 2015

#### Perspective Flies Out The Window

This month's report has two articles up front. The first concerns the volatility that has rattled all financial markets, and some governments, over the past month. Much of the volatility originated in changes the Chinese government and People's Bank of China (PBOC) initiated, beginning in July but becoming more apparent in August. Many of these changes will bear long-term positive fruit. The shift to a new world paradigm for financial and monetary markets caught a lot of investors by surprise, however. Furthermore, the changes and the market reactions spawned an obscene amount of totally preposterous and over-sized fears in global commodities, equities, fixed income, and currency markets.

The first article deals with precious metals markets over the past month, and where they are likely to head.

The second article focuses on the immediate and long-term implications for gold markets and prices of a major shift in the PBOC's posture toward gold.

After falling sharply in July and early August, precious metals prices recovered by the end of the month. Gold prices had the strongest recovery, finishing the month at \$1,132, up from \$1,085.30 on 5 August, the lowest settlement price since February 2010, and up from \$1,094.90 on 31 July 2015. Other precious metals prices were also up from the lows that they reached during the first few days of August, but silver and palladium remained below their settlement prices at the end of July while platinum rose 2.6% over the course of August to \$1,010.50 from the end of July.

The rebound in gold prices, primarily, reflected investors covering previously established short positions. There was some increase in fresh long demand, but most of the buying seemed to be from investors buying back their short positions. Total open interest on the Comex gold futures market dropped 7.4% from the low of gold prices on 24 July to 1 September.

#### Report Contents

Perspective Flies Out The Win	Platinum.....	p.30
derV.....	Palladium.....	p.38
Price Targets.....	Rhodium.....	p.45
Gold.....	Precious Metals Price Table.....	p.46
Silver.....	Equities & Metals Tables.....	p.47-48

#### Market Data

(Data as of 1 September; Changes from 4 August)

Types: Comex, Nearby Active Prices	% Δ	\$Δ
Gold 1,024.00	↑ 3.5%	34.20
Silver 14.70	↑ 0.2%	0.03
Platinum 1,010.00	↑ 5.5%	54.00
Palladium 980.00	↓ -2.2%	-22.00
Rhodium 780.00	↓ -0.5%	-40.00

\*Weekend prices a 90-day price.

Types: Comex Inventories

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## Gold Long-Term Outlook

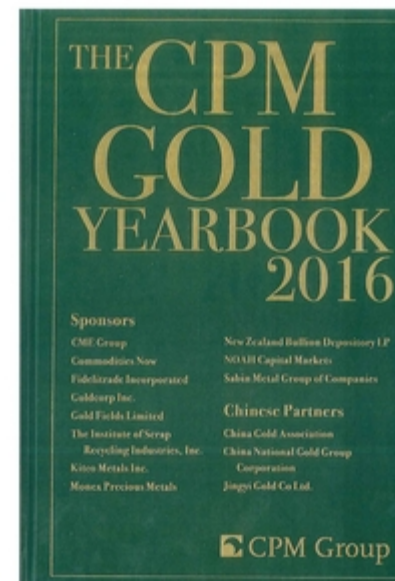
A comprehensive study of the global gold market including projections through 2025 of gold supply by mine and scrap, demand by end-use, official transactions, investment demand, and prices.



September 2015

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