



CPM Group

# Platinum Group Metals Long-Term Outlook

*A comprehensive study of the global PGM market including projections through 2020 of PGM supply by mine, demand by end-use, and prices.*



*September 2011*

---

CPM Group  
30 Broad Street, 37<sup>th</sup> Floor  
New York, NY 10004  
USA

Telephone: 212.785.8320  
Fax: 212.785.8325  
E-mail: [pgm@cpmgroup.com](mailto:pgm@cpmgroup.com)  
Website: [www.cpmgroup.com](http://www.cpmgroup.com)

FOR INTERNAL CORPORATE USE ONLY.

**NOT FOR REPRODUCTION, DISTRIBUTION, OR RETRANSMISSION OUTSIDE OF CPM CLIENT COMPANY WITHOUT WRITTEN CPM GROUP CONSENT.**

CPM Group  
30 Broad Street  
37<sup>th</sup> Floor  
New York, NY 10004  
USA

Telephone: 212-785-8320  
Telefax: 212-785-8325  
E-mail: [pgm@cpmgroup.com](mailto:pgm@cpmgroup.com)  
Website: <http://www.cpmgroup.com>

Authors: Rohit Savant  
Erica Rannestad  
Mu Li

Jeffrey M. Christian, Managing Director  
Doug Sherrod, Managing Director, Investment Banking  
Matt Taub, Manager of Corporate and Institutional Sales  
Alec Kushnir, Director, Investment Banking  
Carlos Sanchez, Director of Risk Management  
Jenee Peele, Administrator

Catherine Virga, Director of Research  
Rohit Savant, Senior Research Analyst  
Erica Rannestad, Research Analyst  
Justin Honrath, Research Analyst  
Mu Li, Research Analyst  
Madhusudan Daga, Consultant  
Bhargava Vaidya, Consultant

**September 2011**

*The information contained here has been obtained from sources we believe to be reliable. We believe this information to be reliable, but do not guarantee its accuracy or completeness. Opinions expressed here represent those of CPM Group at the time of publication. This material is for private use of subscribers. CPM Group is not soliciting any action based on it. Information contained here should not be relied on as specific investment or market timing advice. At times the principals and associates of CPM Group may have long or short positions in some of the markets mentioned here.*



## Price Forecasts: Base Case Scenario.....11

### Base Case Scenario: Platinum

Chart: Real and Nominal Platinum Prices.....	11
Chart: Platinum Surplus and Deficit.....	12
Chart: Platinum Supply and Demand.....	13
Table: Platinum Supply, Demand, and Prices.....	15

### Base Case Scenario: Palladium

Chart: Real and Nominal Palladium Prices.....	21
Chart: Palladium Surplus and Deficit.....	22
Chart: Palladium Supply and Demand.....	23
Table: Palladium Supply, Demand, and Prices.....	24

### Base Case Scenario: Rhodium

Chart: Real and Nominal Rhodium Prices.....	30
Chart: Rhodium Surplus and Deficit.....	31
Chart: Rhodium Supply and Demand.....	32
Table: Rhodium Supply, Demand, and Prices.....	33

## Economic Overview.....39

Chart: Real Gross Domestic Product projected through 2016.....	39
Chart: Vehicles Per Thousand People.....	40
Charts: Relation between Global Vehicle Sales and Gross Domestic Product.....	41

## Mine Supply.....42

### Focus on Platinum Group Metals Supply from South Africa.....42

Table: Planned Capacity Expansion at Eskom (2007 — 2018).....	42
Chart: Exchange Rate: South African Rand/ U.S. Dollar.....	44
Chart: Approximate South African PGM Cash Cost Break Down.....	45
Chart: Average South African PGM Cash Costs.....	45
Table: Typical Expected Time Line for Platinum Group Metal Projects.....	47
Table: Pipeline Projects: Deposits Containing Platinum Group Metals.....	48
Table: Average Grades of Precious Metals in the Merensky, UG2, and Platreef Ores of South Africa.....	50
Chart: South African PGM Production Indexed to 100.....	51
Table: UG2 Share of Tonnes Mined from Bushveld Complex by Platinum Manufacturers.....	51
Table: South African Platinum Mine Production, Projected Through 2020.....	56
Table: South African Palladium Mine Production, Projected Through 2020.....	57
Table: South African Rhodium Mine Production, Projected Through 2020.....	58

### Focus on Platinum Group Metals Supply in Russia.....59

Table: Russia Norilsk: Estimated Composition of Platinum Group Metals Ores.....	59
Table: Russian Platinum Production and Exports, Projected Through 2020.....	61
Chart: Russian Platinum Production and Exports, Projected Through 2020.....	62
Table: Russian Palladium Production and Exports, Projected Through 2020.....	63
Chart: Russian Palladium Production and Exports, Projected Through 2020.....	64
Table: Russian Rhodium Production and Exports, Projected Through 2020.....	65
Chart: Russian Rhodium Production and Exports, Projected Through 2020.....	66

### Focus on Platinum Group Metals Supply in North America.....67



<b>Other Producers of Platinum Group Metals.....</b>	<b>68</b>
Chart: PGM Mine Production in Zimbabwe.....	68
Table: 4E Resources in Zimbabwe.....	68
<b>Secondary Supply.....</b>	<b>70</b>
<b>Focus on Platinum Group Metals Secondary Supply.....</b>	<b>70</b>
Chart: Platinum Secondary Supply and Price.....	70
Table: Vehicle Scrappage Schemes in Europe and the United States.....	71
Chart: Palladium Secondary Supply and Price.....	71
Chart: Rhodium Secondary Supply and Price.....	72
<b>Fabrication Demand.....</b>	<b>75</b>
<b>Focus on Platinum Group Metals Demand in Automotive Catalysts.....</b>	<b>75</b>
Chart: Autocatalysts' Use of PGMs (1976 — 2020p).....	75
Chart: Global Vehicle Sales (1999 — 2020p).....	76
Table: Global Vehicle Production (1999 — 2020p).....	77
Table: Global Vehicle Sales (1999 — 2020p).....	78
<b>Trends in the US Auto Market.....</b>	<b>80</b>
Chart: Vehicle Sales in the United States (1999 — 2020p).....	80
Chart: Ratio of U.S. Car to Light Truck Sales.....	81
Chart: Monthly Vehicle Sales in the United States.....	82
<b>Trends in the European Auto Market.....</b>	<b>83</b>
Chart: Vehicle Sales in Europe (1999 — 2020p).....	83
Chart: Average Engine Size of Newly Registered Vehicle in Europe.....	84
Chart: Diesel Engine Share of New Car Registration in Western Europe.....	85
<b>Trends in the Japanese Auto Market.....</b>	<b>87</b>
Chart: Vehicle Sales in Japan (1999 — 2020p).....	87
<b>Trends in the BRIC Auto Market.....</b>	<b>89</b>
Chart: Vehicle Sales in China (1999 — 2020p).....	89
Chart: Vehicle Sales in Brazil (1999 — 2020p).....	90
Chart: Flex Fuel Vehicle Sales in Brazil.....	91
Chart: Vehicle Sales in India (1999 — 2020p).....	92
Chart: Vehicle Sales in Russia (1999 — 2020p).....	93
<b>Trends in Commercial Vehicle Sales.....</b>	<b>94</b>
Chart: Commercial Vehicle Sales in Major Auto Markets.....	94
<b>Gasoline and Diesel Engines.....</b>	<b>95</b>
<b>Global Emissions Standards by Major Market.....</b>	<b>96</b>
Chart: Percentage Decline in Nox Emissions from Previous Standards.....	96
Chart: European Gasoline Passenger Vehicle Emissions Standards.....	96
Chart: European Diesel Passenger Vehicle Emissions Standards.....	97
Table: Emission Standards in Major Auto Markets.....	97



<b>Platinum Group Metal Demand in Jewelry.....</b>	<b>98</b>
<b>Platinum Group Metals Demand in Electronics.....</b>	<b>99</b>
Chart: Palladium Electronics Demand (1976 — 2020p).....	99
Chart: Platinum Electronics Demand (1976 — 2020p).....	100
Chart: Rhodium Electronics Demand (1976 — 2020p).....	101
<b>Other End-Uses.....</b>	<b>102</b>
Chart: Global Crude Oil Distillation Capacity.....	102
Chart: Rhodium Demand in Glass.....	104
Chart: Palladium Demand in Dental.....	105
<b>Potential Threats to Platinum Group Metals Demand.....</b>	<b>106</b>
<b>Investment Demand.....</b>	<b>109</b>
<b>Platinum Group Metals Investment Demand.....</b>	<b>109</b>
Chart: Annual Net Additions to Platinum and Palladium Exchange Traded Products.....	109
Chart: Net Additions to Platinum and Palladium ETFs as Percentage of Supply.....	110
Table: Month-End Exchange Traded Physical Platinum Holdings.....	111
Table: Month-End Exchange Traded Physical Palladium Holdings.....	112
Chart: Exchange Traded Funds' Physical Platinum Holdings.....	113
Chart: Exchange Traded Funds' Physical Palladium Holdings.....	113
Chart: Gross Long and Short Non-Commercial Positions, Nymex Platinum Futures & Options.....	114
Chart: Gross Long and Short Non-Commercial Positions, Nymex Palladium Futures & Options.....	114
Chart: Positions in Nymex Platinum and Palladium Markets.....	115
Chart: Disaggregated Platinum Commitment of Traders Reports.....	116
Chart: Disaggregated Palladium Commitment of Traders Reports.....	117
Chart: ETF Holdings, Non-Commercial Long Contracts, and Prices for Platinum and Palladium.....	118
Chart: U.S. Eagle Platinum Bullion Coin Sales.....	119
Table: U.S. Eagle Platinum Bullion Coin Sales.....	119
<b>China's Platinum Group Metals Markets.....</b>	<b>121</b>
<b>Focus on Platinum Group Metals Markets in China.....</b>	<b>121</b>
Chart: Chinese Platinum Mine Production.....	123
Chart: Chinese Palladium Mine Production.....	123
Chart: Chinese Mine and Secondary Production of Platinum.....	124
Chart: Chinese Mine and Secondary Production of Palladium.....	125
Chart: Chinese Net Imports of Platinum.....	126
Chart: Chinese Net Imports of Palladium.....	126
Chart: Chinese Net Imports of Rhodium.....	127
Chart: PGMs Fabrication Demand from China's Auto Sector.....	128
Chart: Chinese Passenger and Commercial Vehicle Sales Growth.....	129
Chart: Ratio of Chinese Gasoline and Diesel Vehicle Sales.....	130
Chart: Ratio of Chinese Passenger and Commercial Vehicle Sales.....	130
Chart: Chinese Passenger Vehicle Sales By Size.....	131
Chart: Percentage of Chinese Passenger Car Sales By Size.....	131
Chart: Market Share of SUVs in the Chinese Auto Market.....	132
Chart: Annual SUV Sales in China.....	132



Chart: Chinese Commercial Vehicle Sales By Type.....	133
Chart: Emission Standards For Light and Heavy Duty Vehicles in China.....	134
Chart: Chinese Vehicle Sales.....	135
Chart: Chinese Platinum Jewelry Demand.....	137
Chart: Chinese New Marriage Registration.....	138
Chart: Chinese Palladium Jewelry Demand.....	139
Table: China Platinum Supply And Demand.....	143
Table: China Palladium Supply And Demand.....	144
Table: China Rhodium Supply And Demand.....	145
<b>Platinum and Palladium Markets.....</b>	<b>146</b>
<b>Platinum Markets.....</b>	<b>146</b>
Chart: Platinum—Trading Volume in the Futures Market .....	146
Table: Nymex Platinum Trading Volume.....	147
Table: Tocom Platinum Trading Volume.....	149
Chart: Nymex Platinum Trading Volume.....	150
Chart: Tocom Platinum Trading Volume.....	150
Chart: Platinum—Open Interest in the Futures Market.....	151
Chart: Exchange Stocks of Platinum.....	151
Table: Nymex Platinum Open Interest.....	152
Table: Tocom Platinum Open Interest.....	154
Chart: Nymex Platinum Open Interest.....	155
Chart: Tocom Platinum Open Interest.....	155
<b>Palladium Markets.....</b>	<b>156</b>
Chart: Palladium—Trading Volume in the Futures Market.....	156
Table: Nymex Palladium Trading Volume.....	157
Table: Tocom Palladium Trading Volume.....	159
Chart: Nymex Palladium Trading Volume.....	160
Chart: Tocom Palladium Trading Volume.....	.....160
Chart: Palladium—Open Interest in the Futures Market.....	161
Chart: Exchange Stocks of Palladium.....	161
Table: Nymex Palladium Open Interest .....	162
Table: Tocom Palladium Open Interest .....	164
Chart: Nymex Palladium Open Interest.....	165
Chart: Tocom Palladium Open Interest.....	165
<b>Price Forecast: Alternate Scenarios.....</b>	<b>166</b>
<b>Introduction to Alternate Scenarios.....</b>	<b>166</b>
<b>Platinum.....</b>	<b>168</b>
Chart: Real Platinum Prices, Three Scenarios.....	168
Table: Real Platinum Prices, Three Scenarios.....	169
<b>Scenario 2: High Case (30% Probability).....</b>	<b>170</b>
Chart: Real and Nominal Platinum Prices, High Case.....	170
Chart: Platinum Surplus and Deficit, High Case.....	171



Chart: Platinum Supply and Demand, High Case.....	172
Table: Platinum Supply, Demand, and Prices, High Case.....	173
<b>Scenario 3: Low Case (30% Probability).....</b>	<b>179</b>
Chart: Real and Nominal Platinum Prices, Low Case.....	179
Chart: Platinum Supply and Demand, Low Case.....	180
Chart: Platinum Surplus and Deficit, Low Case.....	181
Table: Platinum Supply, Demand, and Prices, Low Case.....	182
<b>Palladium.....</b>	<b>188</b>
Chart: Real Palladium Prices, Three Scenarios.....	188
Table: Real Palladium Prices, Three Scenarios.....	189
<b>Scenario 2: High Case (30% Probability).....</b>	<b>190</b>
Chart: Real and Nominal Palladium Prices, High Case.....	190
Chart: Palladium Supply and Demand, High Case.....	191
Chart: Palladium Surplus and Deficit, High Case.....	192
Table: Palladium Supply, Demand, and Prices, High Case.....	193
<b>Scenario 3: Low Case (30% Probability).....</b>	<b>199</b>
Chart: Real and Nominal Palladium Prices, Low Case.....	199
Chart: Palladium Supply and Demand, Low Case.....	200
Chart: Palladium Surplus and Deficit, Low Case.....	201
Table: Palladium Supply, Demand, and Prices, Low Case.....	202
<b>Rhodium.....</b>	<b>208</b>
Chart: Real Rhodium Prices, Three Scenarios.....	208
Table: Real Rhodium Prices, Three Scenarios.....	209
<b>Scenario 2: High Case (30% Probability).....</b>	<b>210</b>
Chart: Real and Nominal Rhodium Prices, High Case.....	210
Chart: Rhodium Surplus and Deficit, High Case.....	211
Chart: Rhodium Supply and Demand, High Case.....	212
Table: Rhodium Supply, Demand, and Prices, High Case.....	213
<b>Scenario 3: Low Case (30% Probability).....</b>	<b>219</b>
Chart: Real and Nominal Rhodium Prices, Low Case.....	219
Chart: Rhodium Supply and Demand, Low Case.....	220
Chart: Rhodium Surplus and Deficit, Low Case.....	221
Table: Rhodium Supply, Demand, and Prices, Low Case.....	222
<b>PGM Prices.....</b>	<b>228</b>
<b>The Price of Platinum.....</b>	<b>228</b>
Chart: The Price of Platinum.....	228
Chart: Platinum Price Volatility.....	229
Chart: Platinum-Gold Price Differential.....	230
<b>The Price of Palladium.....</b>	<b>231</b>
Chart: The Price of Palladium.....	231



# TABLE OF CONTENTS

Chart: Palladium Price Volatility.....	232
Chart: Platinum-Palladium Price Differential.....	233
<b>The Price of Rhodium.....</b>	<b>234</b>
Chart: The Price of Rhodium.....	234

