Jack Lifton on how the Tesla effect is driving platinum, palladium, and rhodium around the bend

written by Jack Lifton | November 18, 2020

"Those of you who want to 'speculate' or invest in platinum and palladium can, besides physical ownership of coins and bars, buy futures in London, New York, and other markets. The futures markets have the advantage of being very liquid." – Jack Lifton

The principal Platinum Group Metals (pPGMs), the platinum, palladium, and rhodium are among the most critical of the critical metals that support our health and well-being. This is for two reasons: First of all, the electronic properties of the pPGMs cannot be duplicated by any other known less expensive or more effective substitution, and second, the pPGMs are very rare. The total annual production of all three combined does not exceed 500 tons. The overwhelming use for these PGMs is as the active agents (catalysts) in automotive exhaust emission catalytic converters, in which they catalyze the complete combustion of hydrocarbon fuels (gasoline, kerosine [diesel fuel]), and the reduction of acid forming nitrous oxides to inert nitrogen. Catalytic converters cannot function economically or efficiently without PGMs, so that the rarity of the PGMs ensures that they are among the most recycled industrial metals, since the total annual new production of platinum and palladium is insufficient to meet demand.

It should be noted that the current annual production for the US OEM automotive industry alone uses 200 mta of PGMs for catalytic converters. **Yet the US industry produces only 20% of global**

automobiles and trucks. Both China and Europe produce more cars annually than the US, and until recently the use of pPGMs in Europe by the OEM automotive industry there used a large enough amount of platinum to severely skew its price relationship to that of palladium creating a palladium shortage that has driven up palladium's price to more than double that of platinum, a historically unusual situation.

In general, the very large demand for pPGMs by the US OEM automotive industry arises from the very large proportion of large internal combustion engines (ICEs) used in North America for personal trucks, SUVs, and freight carriage. These ICEs require substantial exhaust emission catalytic converters to comply with increasingly stringent air pollution control regulations.

Until recently the even more stringent European Union air pollution control regulations were thought to be being met by the use of diesel engines rather than gasoline powered ones. Diesels, the large ones used on freight vehicles in particular, require a relatively large amount of platinum to manage their exhaust emissions. In the last two years however, it has been discovered that diesel engines exhaust measurements were manipulated by manufacturers to give the appearance of exhaust emission compliance. Diesel sales in Europe, by far their largest market, have plummeted releasing enough platinum into the market to drop its price even though it takes more palladium than platinum on a weight basis to manage the hydrocarbon exhaust of an ICE.

I think this demand skew is temporary and the price rises and price differentials among the pPGMs also an artifact of the sudden interest by investors in "doing a Tesla" with the pPGMs. The pricing of the pPGMs, palladium and rhodium in particular, is increasingly divorced from their industrial value, and

ironically by increasing the cost of exhaust emission catalyst they help to hasten the conversion of vehicular transport from dependence on ICEs to batteries. This, the lowering of the principal demand for pPGMs, will of course lower the price of the pPGMs. The bright spot in the future may be the use of platinum and palladium in fuel cells, which look to be the electric generators of choice for heavy freight carrying trucks that will utilize hydrogen to power the fuel cells, which will themselves need platinum and/or palladium to produce electricity by catalysis of hydrogen "fuel."

The most absurd of the latest "investment vehicles" for pPGMs are the one and five-ounce "certified" bars of rhodium, the very rarest of the pPGMs, being offered to "investors." There is no agreed standard for rhodium purity and, even if there were, there is no other market for such bars other than the offerors "guarantee" to buy it back in the future for some price calculated by them as a "market" price. Rhodium bars have no industrial use other than as a feedstock to make the rhodium chemicals used in the application of the pPGMs to the wash coats of automotive exhaust emission converters; the high temperature apparatus involved in the manufacture of high purity glasses and fibers; and the industrial production of nitric acid. Manufacturers using rhodium for the above do NOT buy individual bars of "investment grade" rhodium from private parties. Nor do they inventory rhodium in such a form.

Platinum has been used for jewelry and even coins almost since its discovery in native (placer) form in South America in the late eighteenth century. Palladium jewelry and coins have been tried but have never caught on with the public. Massive rhodium is not suitable for jewelry manufacturing, but a thin coating of it on silver has been used to prevent tarnish. This source of "value" is what drives the nonindustrial market for these metals. There is no liquid market for trading small quantities

of these metals. Like gold, pPGMs must be analyzed before any industrial use and this analysis is too costly for small lots. National coins can be traded using posted prices on the London Platinum and Palladium Market, but this is purest reasoning by false analogy. Coins have no use as industrial feedstocks.

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Let’s look at the supply of pPGMs, also, of course, an investment, if realized through the purchase of shares of publicly traded miners, juniors, and fabricators on major high-volume exchanges.

The majority of the world’s platinum comes from Southern Africa. The Republic of South Africa and Zimbabwe are fairly recent as independent states ruled by their indigenous peoples, but pPGM mining and refining were introduced nearly a century ago by Europeans for whom costs such as labor, safety, and health held little interest when measured against the profits obtainable by ignoring them. The transfer of majority ownership of the mines and smelters to the “native” populations has added costs of improving health and safety as well as of empowering labor to seek wage increases. These factors have increased the costs of producing pPGMs and have reduced the output of the mines and smelters. These factors have naturally increased the market prices of the pPGMs as their already small supply and regular delivery has been further reduced or impaired.

The world’s other two relatively large sources of pPGMs, Russia and North America, produce primarily just palladium. The only producing American mine and smelter, at Stillwater, Wyoming, is owned by Russia’s Norilsk Nickel, Russia’s main producer of

palladium as a companion metal to its nickel production, and, in fact, Stillwater produces more pPGMs from automotive exhaust emission catalyst scrap than from its ore body. In Canada, Vale, Sudbury, produces palladium also only as a companion metal to its nickel production. Thus, for non African produced pPGMs the amount produced depends on the nickel market.

If and as now looks likely when the production of ICE powered vehicles declines the demand for new pPGMs will also decline, but it is likely also that the demand for pPGMs used in catalytic converters may be replaced by a demand for them (other than rhodium) for use in fuel cells, which look like the best candidates for generating electricity onboard for freight carriage by wheeled transportation and even by tracked transportation. A typical fuel cell today uses an ounce of pPGMs as the catalytic materials that transform hydrogen gas into water and generate electricity (at room temperature) by doing so. Thus, if new production of pPGMs today were to be used entirely for fuel cell manufacturing some 13 million fuel cell powered (hydrogen powered) vehicles per year could be manufactured globally. In the USA, which scraps 15 million vehicles per year, the recovered recycled pPGMs could be used to produce up to 4 million fuel cell powered cars per year until the supply of scrap ICEs were exhausted in 20 years.

It looks likely now that Class 8 freight hauling trucks will be converted to fuel cell operation rather than battery operation as a weight and resource saving measure. In the long term this use for pPGMs will become dominant.