

## The Most Disadvantageous Lottery in the World

**Ian Runge**

*Founder/Director, RPMGlobal, Brisbane, Australia*

20-Jul-2017

⚡ This is the full prepared version of the paper. The presentation version substituted more conversational language and to fit within the presentation time frame did not include text highlighted with the paragraph marker (as shown on the left of this paragraph thus: ⚡.)

# The Most Disadvantageous Lottery in the World

Ian Runge

Founder/Director, RPMGlobal, Brisbane, Australia

## 1 INTRODUCTION

You're probably wondering what the title of my presentation is all about – it is a quote from Adam Smith, known as the father of economics, in his famous book: “The Wealth of Nations.” Adam Smith was evidently no fan of mining.

*“Of all those expensive and uncertain projects, however, which bring bankruptcy upon the greater part of the people who engage in them, there is none perhaps more perfectly ruinous than the search after new ... mines. It is perhaps the most disadvantageous lottery in the world, or the one in which the gain of those who draw the prizes bears the least proportion to the loss of those who draw the blanks.”*

*Adam Smith in: “The Wealth of Nations” (1776)*

According to Smith, people who engage in the search for new mines are participating in the most “disadvantageous lottery in the world.”

Maybe. Yet 241 years after his seminal work was first published, the world produces more copper, coal, gold, iron and other products than it has ever done before at prices that are cheaper than ever before.

There is no doubt that if you treat the business of investing in this industry just like a lottery it probably will turn out to be a disadvantageous one.

Probabilities certainly do count. But so too do economics, and the fundamentals of mining.

My objective here is to help tilt the playing field in your favour from a pure lottery-type investing strategy to one that has a solid technical and economic foundation.

With a mix of mining knowledge, technology, and economics I'll outline some of the big trends that are playing out. You can decide what commodities to get involved in and the relative attractiveness of mining investments compared to other things you might put your money into for the long term.

I'll be talking about real business opportunities in the industry, as opposed to equity investments. Sometimes they're the same, sometimes they're not. So for

example, for real business opportunities, I am pretty bullish on the USA right now – a lot of structural reform has happened, households have largely finished the deleveraging process, and for a nation so dependent on the motor car the decline in crude oil prices is a tailwind for real economic growth. But for equity investments in USA I'm not so bullish ... as a result of the loose money policies of the Federal Reserve, equity markets in USA have had a really good run over the last 8 years or so, but interest rates are now going up and this is a definite headwind for equities. So take this difference on board.

The presentation is in three parts:

### **1. Mineral Commodities – Long Term Reserves and Prices.**

When our industry is subject to wild short-term fluctuations it is hard to get much focus on the longer term trends. Often it is only by looking at some very long term trends that we can see some of the things that are happening today.

### **2. The Global Economy.**

The last 15 years or so have been dramatic for commodity prices – influenced mainly by the China boom and subsequently by the Global Financial Crisis.

What causes booms and busts, and now, 9 years after the 2008 bust, are we done with this crisis or is there another one brewing?

### **3. Technology.**

The world advances with technology, and while many people remain distracted by the aftermath of the GFC, others have moved on and brought about a revolution in their field. Think: horizontal drilling and hydraulic fracturing, for example.

How can we understand the technological changes, not just in mining, but in the world generally?

Finally I offer some cautionary notes and some guidance for exploration and investing in mining generally.

*And ... a warning:* Companies and investors in mining and mineral exploration are an optimistic lot – but we're also prone to a certain amount of cognitive dissonance ... seeing only the things we want to see. We've got to be guarded against that. So, throughout the discussion expect to be challenged and to hear some things that you'd rather not hear. Sorry. Economics is the dismal science after all.

## 2 MINERAL COMMODITIES – LONG TERM RESERVES AND PRICES

### 2.1 Reserves of Mineral Commodities

It is common perception that all the key mineral commodities are gradually becoming exhausted. You've all heard it many times ... we must conserve existing resources and focus on recycling and on the use of alternatives, especially renewables.

Intuitively appealing but factually incorrect. Table 1 shows the results from one study illustrating the situation between 1950 and 1980.

Mineral	Reserves (1950)	Production (1950-1980)	Reserves (1980)
Aluminium	1,400	1,346	5,200
Copper	100	156	494
Iron	19,000	11,040	93,466

Table 1 – Reserves and Production of Selected Minerals, 1950, 1980

The production of copper, for example, in the 30 years following on from 1950 exceeded the reserves in 1950 by more than one-and-a-half times, but still we found even more - the reserves by 1980 were nearly 5 times the reserves at the start.

Updating this table to 2017 presents some complexities because the definition of “reserves” has changed, so for an arguably better comparison with Table 1 the modern “resources” number has been used as shown in Table 2.

Mineral	“Reserves” (1980)	Resources (2016)	Years of Production
Aluminium	5,200	16,000	>100 years
Copper	494	2,100	>100 years
Iron	93,466	230,000	>60 years

Table 2 – Reserves and Production of Selected Minerals (updated to 2016)

Not only has production gone up dramatically in the 36 years since 1980, but the resources position in terms of years-of-production has also gone up.

Of course, the growth in reserves is not a smooth upward trend every year. Over the last 5 years or so the reserve position for most minerals has almost

certainly declined because in down-turns mining companies cut back on exploration.

This trend [to maintain a relatively constant reserve position in terms of years-of-production] is a consequence of simple economics. Exploring for and proving up reserves is costly. It is uneconomic to spend money *now* to prove up reserves too far into the future, because the return from this effort (from exploiting them) only materializes when they are extracted.

In 1978, for example, I was visiting the Ceour d'Alene mine in Idaho, one of the most important mines in this famous silver mining district. At that time the mine had been going for 98 years, and they informed us that they had 5 years of silver reserves. When I asked them "does that mean that after 98 years you'll probably close in about 5 years time?" the reply was: "No, our current reserve position is our best ever - in our 98 years of operation we have *never* had more than 5 years of reserves in front of us."

I've heard it said, for example, that we shouldn't be relying too much on Lithium-ion batteries because the reserves of lithium are limited. I don't think so. There is no evidence to suggest that any of the important mineral commodities are becoming exhausted or indeed ever will be exhausted.

## 2.2 Long-term Prices of Mineral Commodities

When it comes to sustainable production of mineral commodities, sufficient reserves are only half the equation. The other half is "cost."

In a market economy if there is a shortage of any commodity, the price will rise until supply matches demand. In this purely economic scenario the world will never run out of any mineral commodity. However the price might be high and ever-increasing ... not an attractive future to look forward to if you are a consumer.

Is this table just underpinned by ever-increasing commodity prices?

The answer is: No.

There are short term fluctuations in the price of all commodities, but when these changes are excluded *the long-term price of most mineral commodities is either constant in inflation-adjusted terms, or declining.*

For example, Figure 1 shows the price of iron ore since 1885, corrected for inflation and plotted on a relative log scale.

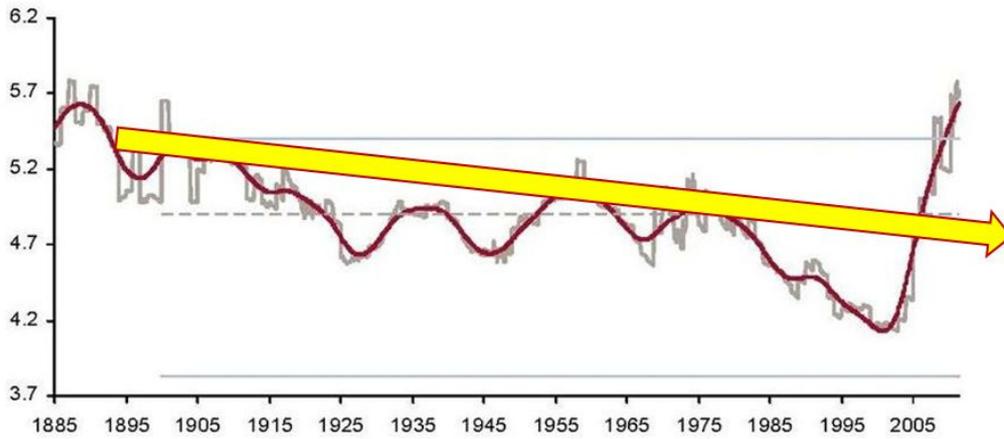


Figure 1 – Long Term Price of Iron Ore

Apart from the dramatic short-term price spike in the early 2000s, the long-term trend in the iron ore price is unambiguously *declining*.

Figure 2 shows the same trend with the long-term price of copper.

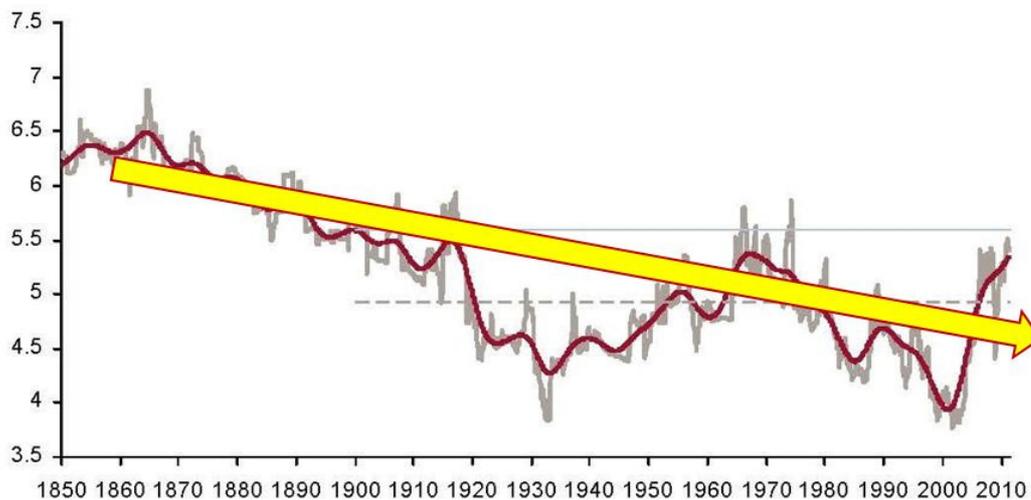


Figure 2 – Long Term Price of Copper

This too shows an unambiguous down trend over the last 160 years.

Both of these graphs came from a previous presentation which is why they finish in about 2010 when prices were high, but if I updated them to 2017 the current prices would be about on the long term trend line.

Despite increased demand, despite deeper more complex and lower-grade orebodies, and despite increased environmental and safety imposts, technology to find and exploit orebodies at competitive prices has more than kept pace with the rate of exhaustion of known deposits over at least the last 150 years. It is a great story!

In Figure 2 the copper price shows a big reduction in the early part of the 20<sup>th</sup> century. Prior to 1907, nearly all the copper mined came from underground vein deposits ... in the USA averaging 2.5 percent copper. No one knew how to treat sulphide ores economically. Then the froth flotation process was developed. By the end of the 20th century just about all copper mining was from sulphide ores and treated by froth flotation, and the average grade of copper ore mined in the US had fallen to 0.6 percent - less than one-quarter of the 1907 average.

The long-term price reflects the fundamental costs of production. This declining trend is almost totally due to advances in technology.

### 3 INGREDIENTS OF BOOM/BUST CYCLES

Now I turn to commodity prices over the last 15 years or so and the impact of the China growth story and the global financial crisis.

In 2012 I presented a public lecture, the title of which was “Is the Boom already becoming a Bust, and Are We Prepared?” There is a copy of it on my website: [IanRunge.Com](http://IanRunge.Com).

Figure 3 shows the price of iron ore at the time – in 2012 iron ore was about \$150/tonne after recovering fairly quickly from the big dip in 2008. Most industry practitioners saw the broad upward trend intact, and I was roundly criticized by several people for voicing the alternate view as if by articulating it I might somehow cause the bust.



Figure 3 – Iron Ore Price, 2005 to 2012

For completeness Figure 4 shows the iron ore price graph extended to today with the price in May-2012 shown.



Figure 4 – Iron Ore Price, 2008 to 2017

In this 2012 lecture I outlined the ingredients for any boom/bust cycle. I won't do that again here but instead will jump to where I think we are in this cycle.

This cycle has, or had, two elements:

1. changes to the structure of production due to the emergence of Chinese manufactured goods on the world markets, and
2. distortions caused by the easy money policies of the central banks coupled with an ill-disciplined financial system.

Every “global” boom/bust event involves the financial system because for something to be *global*, there must be an input that affects everybody or nearly everybody. That input is money.

I have used the term “*ill-disciplined* sources of finance” and poor discipline on the finance side was certainly a characteristic of the world before 2008 and again, since then. But conceptually you just need finance as the transmission mechanism – it doesn't necessarily have to be ill-disciplined.

Most commentators lay the *blame* for the global financial crisis just on these finance and money elements. The monetary system certainly isn't just an innocent player. But ascribing the cause of the boom and bust only on monetary factors is too simple an answer. Nevertheless this is a discussion that will take more time to pursue than we've got today.

The reduction in the price of consumer goods from China masked the underlying impacts of the money supply growth. Macroeconomists who were

only looking at *consumer* goods prices to discipline money supply growth promoted excesses in the non-consumer markets, particularly housing.

With interest rate declines and no penalty to pay off a high-rate loan and substitute it for a lower-interest-rate loan people in the USA refinanced their houses on a very big scale – taking out cash in the process. Over a period of several years leading up to 2008 people *in aggregate* were spending 5% or more on consumption goods than they really should have based not on their ability to fund, but on the artificially inflated and distorted value of their homes.

Figure 5 shows that in 2006, for example, 90% of people who refinanced didn't just refinance the amount owing at a lower interest rate – they took out a new loan for more than the value of the old loan, and they spent the difference.

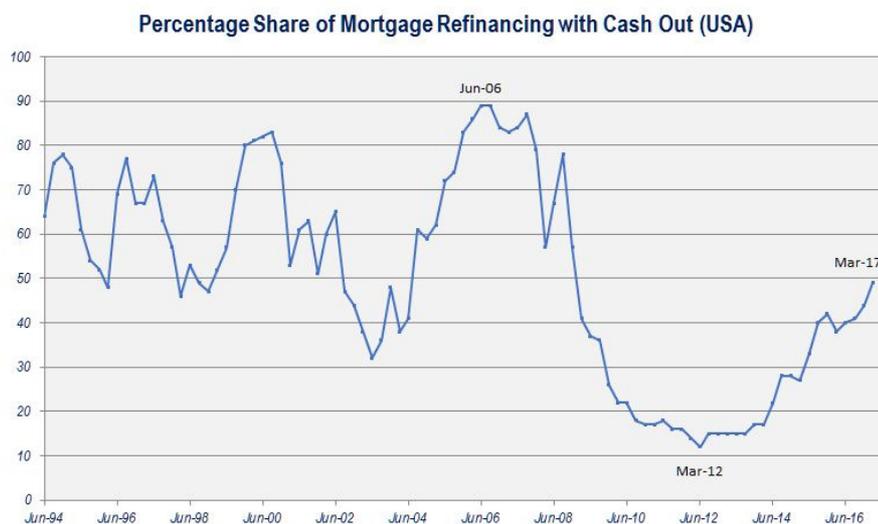


Figure 5 – Percentage Share of Mortgage Refinancing with Cash Out, 1994 to 2017

Macroeconomists commonly refer to this effect as a “savings imbalance.” Keynesian economists might use a term like the “marginal propensity to consume.” I would simply characterize it as the ordinary guy being fooled into spending more than he really wanted to spend, based on the inflated and distorted value of his home.

The GFC (Global Financial Crisis) wasn't *just* a financial problem.

It involved real changes to the structure of production, finance mismanagement, and distortion of household spending patterns.

This is why the rebound has turned out to be slower than many commentators predicted.

Have we fixed the problem and can we safely move on? The short answer is ... Yes.

I think the adjustment due to changes in the structure of production in the western world is largely behind us.

Figure 6 shows Chinese imports and exports since 2000.



Figure 6 – Chinese Exports and Imports, 2000 to 2016

During the *growth* phase goods out of China squeezed their way into whole sectors of the world economy through lower prices, causing lots of disruption. This *growth* has now abated so the major disruption caused by this has now been absorbed, at least in the more adaptable economies in the world.

Those previous jobs in the apparel, furniture, and footwear industries are not coming back except in specialist niche markets that are less dependent on price. Other industries where the western world is competitive have expanded and taken up the slack. *Think:* Computers and microprocessor controlled Machinery, Aircraft (both military and civilian), Pharmaceuticals, Australian Property – good climate, no pollution, relatively safe.

On the finance side the gross distortions that slammed us in the face in 2008 have also largely been shaken out of the system. *Think:* Lehman Brothers, Bernie Madoff.

And the same with household finances.

Figure 7 shows real personal consumption expenditures in the USA for the period leading up to 2008, and since then.



Figure 7 – USA Personal Consumption Expenditures, 2000 to 2016

The ordinary guy has also largely adapted to the consumption mis-match - the over-consumption he indulged in prior to 2008 has now been balanced by enough under-consumption since then. However even in the USA this has taken 6 or 7 years, and in less adaptable countries this still isn't finished.

Figure 7 explains why the economy has been so sluggish for so long, despite massive monetary stimulation. Households have been putting their households in order. But, at least in the USA, this period is now over and we'll see growth pick up.

This doesn't mean we're out of the woods. The GFC exposed shortcomings in the financial structure in various places around the world and these are still with us. Europe, for instance. China itself has some issues.

Also I find it intriguing that a major cause of the crisis was excess money supply growth leading to low interest rates, yet since then the solution adopted around the world by central banks has been *even lower interest rates!* The capital markets around the world are being grossly distorted, and we won't escape this distortion without paying a price. Are we setting ourselves up for another big crash? This time will it result in massive inflation? Will this be good for gold and bad for everyone else? I'll return to this issue at the end of my talk.

## 4 TECHNOLOGY

Earlier I mentioned technology with an example of the invention of froth flotation. That example involved Copper *Sulphide* ores – an ore type previously spurned because the copper was too difficult and too expensive to extract.

### 4.1 Technology: Example 1 - Oil

Now look what is happening with oil. We've known about oil shales for decades but as a *primary* source of oil and gas they were spurned because the oil and gas was too difficult and too expensive to extract.

Not any more. Today it is mostly in the USA where this oil shale revolution is playing out, but this is only because they have a great pipeline infrastructure in place, so there is a fast turn-around from sinking a well, to getting revenue from it.

Other countries have similarly good deposits and the same thing will happen in these places once they get transportation infrastructure in place.

In the meantime, the US players are developing the technology to produce oil and gas from this source at ever-decreasing costs. Figure 8 is a photo from flying over Western Texas.

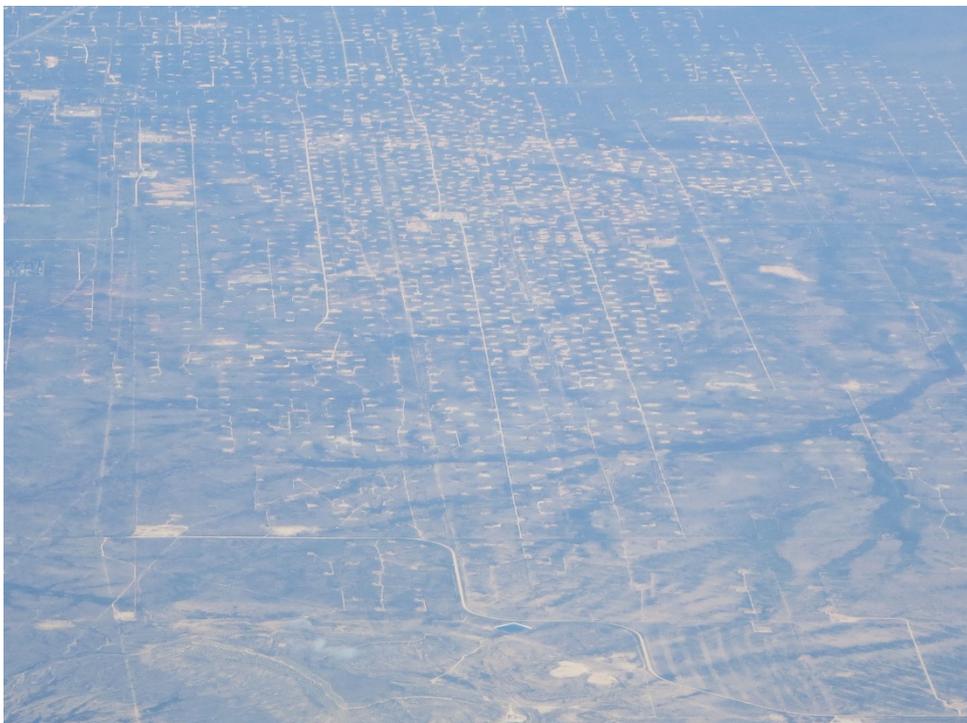


Figure 8 – Oil Shale Drilling in West Texas, 2016

Each of those dots is a well. How wide spaced do you think those wells are? A hundred metres apart? And each well will have a web of horizontal holes emanating from it to draw in oil and gas from that distance.

I took this photo last year. In the last couple of years the technology has advanced dramatically... now operators can drill horizontally up to 2 miles, implying a drill hole density perhaps only one-twentieth or less of what is shown in this photo. Now there can be 30 or more stages from each bore. 3 years ago a single well took 40 days to drill, now it is 20 days.

What about economics?

Conventional oil wells have low cash costs but – particularly off-shore wells – have high capital costs and can take years to bring into production. In today's volatile market that is a big investment risk.

Oil from shale has higher operating costs but lower capital costs, and much lower risk because of the short time from initial expenditure to production and revenue.

On a total cost per barrel basis, accounting for time value of money, very few conventional wells – and particularly those in deep water – can compete.

Let me put this in perspective in the same way as I previously did with copper.

Figure 9 shows the 5-year chart for oil price. These shorter-term charts really only give guidance that you shouldn't be guided by, but I put this up mainly as an illustration of the cognitive dissonance mentioned earlier.

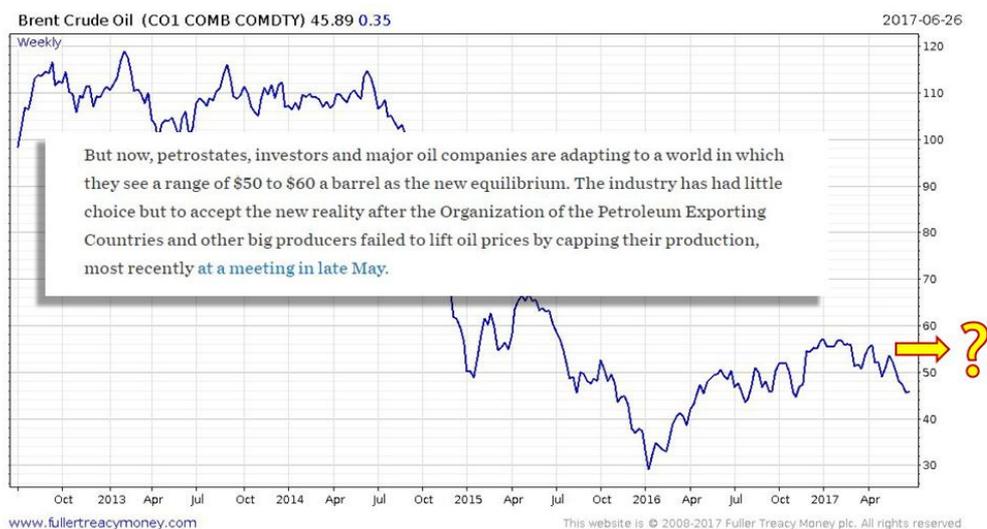


Figure 9 – Oil Price (Brent Crude, US\$/barrel), 2012 to 2017

The quote highlights that certain parts of the industry have seemingly convinced themselves that oil will likely settle on a new equilibrium at around \$50 to \$60 per

barrel. I don't think so. The long term price charts don't support such a hopeful outcome, and neither do the fundamentals.

Figure 10 and Figure 11 show the price of oil since 1990 and since the start of the last century respectively.



Figure 10 – Oil Price (Brent Crude, US\$/barrel), 1990 to 2017

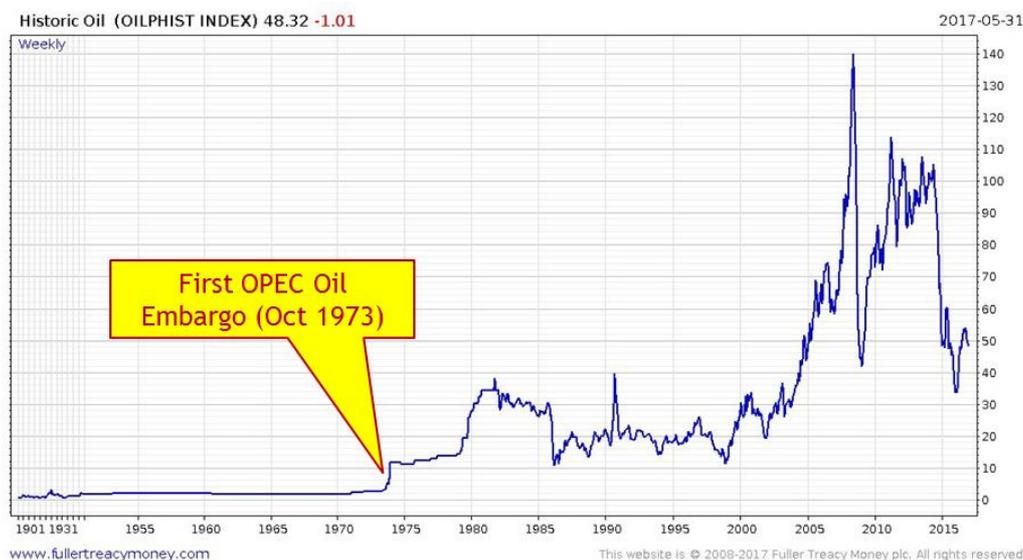


Figure 11 – Historic Oil Price (US\$/barrel, inflation adjusted to 2017), 1900 to 2017

I'll bet there are not too many people here who would remember that as late as the year 2000 oil was less than \$20/barrel.

The oil people here are going to hate me for saying this, but if you look at these trends it is hard to see how the oil price is going anywhere but down from where it is today. \$25/barrel a probably a good estimate.

Here's why:

- **Technology** is significantly reducing the costs of production
- **End of OPEC.** Oil prices since 1974 have been supported by an uncommon monopoly – OPEC – which, in terms of sustaining high prices, is essentially dead. Think about it: for OPEC to sustain high prices they have to withhold production from the market in ever-increasing amounts, *and not cheat on each other*. If you believe in high priced oil then essentially what you are betting on is that Russia, Saudi Arabia, and Iran will all trust each other not to cheat on their quota. I certainly don't like the odds in such a bet.
- **Demand headwinds.** If oil settles on \$25/barrel then the price of petrol is also going to be much lower and demand will increase. But increased demand is also facing a headwind in terms of greater engine efficiency, growing use of electric vehicles, and, of course, cultural pressures antithetical to any carbon-dioxide-emitting technology.

Which brings me to the next technology segment: **Batteries and Technology.**

#### 4.2 Technology: Example 2 - Batteries

Elsewhere at this conference there is a whole session on batteries and associated technology, so the comments here will be limited. Putting it simply, I believe there is huge potential of advanced battery technologies, not just for electric cars and non-exploding iPhones, but for a whole host of new ways of doing things.

This potential is no better illustrated than at the annual consumer electronics show in Las Vegas. CES hosts literally thousands of people – entrepreneurs – making hundreds of devices whose viability is based on better batteries. Using current battery technology many of these devices have only narrow applicability and limited economic viability, but with modest improvement in battery technology become economically and technically viable. Many of the new battery technologies use the same materials as Lithium-ion batteries – lithium, graphite, nickel, cobalt – but producers of these minerals might also like to hedge their bets with other minerals in the event that some other technology wins out.

Table 3 lists 16 such battery technologies, some advanced, some little more than an idea in an academic laboratory, but each one trying to best the incumbent in terms of cost, charge rate, number of charge cycles, weight, or safety.

Table 3 – Some Alternative Battery Technologies – Distinguishing Characteristics

Type	Distinguishing Characteristic (claimed, or hoped-for)
Lithium-ion	The incumbent. Liquid electrolyte. 500-1500 cycles
Lithium-ion solid state	Safer (no liquid electrolyte), 20-30% better power density, charge faster, 10,000+ cycles
Lithium-ion silicon	Silicon anodes instead of graphite. 3x performance, lower cost
Lithium-air	O <sub>2</sub> as oxidizer. 1/5 as light, cheaper, 50x capacity
Gold nanowires	Gel electrolyte. Recharge 200,000+ times
Magnesium	Smaller, more dense
Fuel cell – Stainless Steel + thin-film electrolyte	More durable, longer lasting
Graphene	Charge and Discharge 33x faster; 5x capacity/weight
Laser micro-supercapacitors	Bendable, charge 50x faster
Sodium-ion	2,000 cycle lifespan, 7x more efficient
Prieto Foam 3-D	Safer (no flammable electrolyte); 5x capacity/weight
Nano 'yolk'	Charge in 6 minutes, degrades much slower, cheap production easy to scale
Aluminium Graphite	Not as powerful as Lithium-ion, but charge to full in about one minute
Aluminium-air	40x capacity, very light, batteries need to be swapped out every few months (Al > Al(OH) <sub>3</sub> )
Ryden dual carbon	Lasts longer, charges 20x faster, 3000+cycles
NTU fast charging battery	Charge to 70% in 2 minutes. 10,000 cycles

With such substantial resources being applied, breakthrough's will inevitably happen, and the implications for society will be profound. This is the biggest thing to happen to electricity since the discovery of it.

Previously I expounded the view that oil was headed for \$25/barrel or less, and if this eventuates it will definitely erode the competitiveness of, and delay the rate of application of electric cars, for example. But the momentum now behind these technological advancements means that even low-priced oil is unlikely to stop the advance, just delay it until even more (bigger) players get involved in it.

The internal combustion engine is not going to disappear overnight, and definitely not in the time frames that many pundits are saying. The lesson from technological innovation throughout history is that old technologies can co-exist with the new for a long time. There are huge sunk costs in the conventional

automobile industry and these elements will be priced at marginal cost (often, near zero) before such industry disappears. Electric cars need electricity to recharge, and this means construction of new power stations as well as new and different infrastructure to support them. Sometime between now and when electric vehicles are indeed king of the road, society has to face up to the economic cost and externalities associated with both the old and new technology. This will take time. Economics will decide the winners and the time-frame.

## 5 CONCLUSION

One lesson from all of the above discussion is that technology can deliver. The competitive, free enterprise system works.

Unfortunately for as long as I have been in the industry it has been plagued by the influence of non-market forces, namely governments, whose actions aren't nearly as reliable, consistent, or predictable.

In the 1960s and 70s for example production from the Zambian copper belt was a big disrupter in this market. Whenever the price of copper fell production wouldn't decrease as would normally be the case in a free-market environment ... mines in Zambia would *increase* production because the country needed the cash. This only exacerbated the down-turn. There are many other examples.

In this last section I focus on just two examples of these non-market forces at play.

### 5.1 Non-market Forces to Watch out for

**China.** Chinese industry is dominated by government-owned enterprises that often do things with little respect for market forces. So far the Chinese influence has been quite beneficial to us in the Australian mining industry. However there are some dark clouds on the horizon, particularly related to overcapacity.

- **Steel.** China produces more than 50% of the world's steel, a production capability far in excess of domestic demand. Already there are claims of dumping this on the world market. If I was exporting steel-making raw materials to China I'd be having a pretty sober look at this.
- **Cement.** In the years 2011 to 2013 – just 3 years – China produced more cement than the USA did in the whole of the 20<sup>th</sup> century!

These industries are largely instruments of the state, and there is no certainty how the state might react as economic forces reassert themselves. I can't help thinking that the much publicised "New China Silk Road" – the one belt one road initiative – probably has less to do with trade and much more to do with a project to absorb the massive over-capacity in their steel and cement industries.

From a doing-business-with-China perspective the key point is this: that China itself has some huge industrial structural imbalances. Frequently mentioned also are their governance issues, property rights issues – particularly intellectual property – and a growing demographic imbalance. They have benefitted hugely from trade over the last 15 years, and so have we in Australia by supplying them minerals, but .... this is definitely not the one basket in which you should be stashing all of your eggs!

**Central Banks.** The second non-Market force that I highlight impacts all of us – **the world's central banks.**

Since 2008 the central banks of the world have been on a binge the likes of which we have never seen before. Previously they only involved themselves in the very short term markets, but this time they have involved themselves in long term bonds, mortgage-backed securities, and, in Europe, even corporate bonds.

Figure 12 shows the Federal Reserve Balance Sheet in the USA which has quadrupled in the last 8 years.



Figure 12 – USA Federal Reserve Balance Sheet, 1998 to 2017

With their cost of money at zero they have totally distorted the capital markets. The distortions will ultimately have to unwind, and this isn't going to be pretty. Every investor should be alert to what might happen here.

However, for those gold bugs in the audience who might be thinking that this could lead to massive inflation, with the gold price rising to \$5,000 or more per ounce, I don't have such encouraging news for you.

Expanding the FED's balance sheet is not quite the same as just printing money – in the capital markets in which they are directly involved, yes, but in the consumer markets, no. In a fractional reserve system it is the banking system that really creates the money and this simply has not happened.

- 1) There has been no real appetite for consumer loans up until now, in fact the reverse; since 2008 households have been de-leveraging.
- 2) Regulations such as Dodd-Frank and Basel 3 placed big burdens on banks making it harder to make loans, and
- 3) The velocity of money is at an all-time low.

So right now I cannot see any ingredients that would stoke big inflation. Sorry. By all means purchase gold as insurance against turmoil – and there will likely be quite a bit of that – but not as a hedge against hyper-inflation because I really don't see this as likely.

## **5.2 World Commodity Markets – the State of Play.**

Throughout this talk and elsewhere at this conference there has been much discussion about commodity prices, as if when we sell a tonne of Iron Ore, or Copper, or Coal one tonne is indistinguishable from a tonne sold from some other producer. Not so.

Whilst the LME price of minerals may be the primary benchmark used in sales contracts, every tonne is different and every tonne has to be individually sold. Iron ore from one mine might be high in phosphorus and to place it in the market it probably has to be matched with some other ore that is low in phosphorus. The easiest-to-sell products are obviously the highest grade ones, but every orebody is different and every orebody has characteristics that make it harder or easier to sell. Impurities count ... both positively and negatively.

During the boom period this didn't make much difference. But now it does. All tonnes are not the same.

This is the key to understanding the markets today and understanding the worth of particular deposits.

For example, MMG are developing their massive Las Bambas copper project in Peru. Are they just adding to the glut, making it even further into the future before prices recover? To some extent, yes. But clearly they understand what I am talking about. .. the low arsenic levels in the Las Bambas ore gives them a competitive advantage.

This is the story of exploring for and producing minerals in today's market and is the key take-away from this talk. Remember this if nothing else.

In exploring for minerals we've progressed past the era when anything shiny would do (or, in the case of coal, if it burns you can sell it). Now the way to place your bets is in the companies that really understand the market and can focus on deposits whose characteristics fit in with the demand. If you can do this you can get a premium and, more importantly, you can sell your product at a time when others can't.