

Pottinger

PERSPECTIVES

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THE FUTURE IS ALREADY HERE

**For anyone operating in the present,
please adjust your watches**



How many dramatic industrial revolutions have you witnessed in your career? I'm not referring to something as simple as a category-killer new product. I mean innovations that have changed whole industries, or even created them. If you reflect on the amazing technological progress over the last fifty years, the truth is that we have all seen a surprising number of them.

Information technology has invaded almost every area of our lives – and yet when I first started work in the 1980s, the vast majority of people did not have a computer on their desks. As a child, international phone calls to my grandparents at Christmas had to be booked days in advance, and you could barely recognise the voice at the other end of the line. Meanwhile Star Trek style mobile communications were little more than a figment of science fiction imagination – at least until Motorola unveiled the Startac mobile device which weighed in at just 88 grams, much lighter than today's phones. And throughout this period, more or less everything has been dramatically miniaturised, resulting in the birth (and death) of products as revolutionary as floppy disks, video-tapes and the Sony Walkman. Meanwhile there is every sign that digital cameras are going the same way, as they are replaced by ubiquitous mobile phones.

These developments have led to profound changes in many industries. At the most fundamental level, what we have seen is the removal of constraints on design, function and location and other critical determinants of capability and performance. IT and communications have shrunk tasks and distances and reduced unthinkably challenging problems to the work of the newest and least experienced

staff. Businesses can now provide goods and services across borders and time zones, making global competition a reality of everyday life. Meanwhile marginal costs in many industries have been reduced to minimal levels by scale economies or automation, allowing the smallest businesses to rent access to the largest and most complex services on entirely affordable terms. Nowhere is this truer than in raw computing power, where with nothing more than your Amazon login details, anyone on the planet with a few cents to spare can dial up access to some of the world's most powerful computers in just seconds, with no need to book in advance.

Very few boards or management teams saw any of these changes coming. Indeed only a small minority even recognised these revolutions once they began to take hold. If your reaction is to disagree with this bald statement, ask yourself this question. If big business was so adept at riding the revolutionary waves, why is it that so many of the winners in this new age of technology have been new companies, often founded by kids with no prior business experience? And why is it that so many old world companies – who had the scale, the credibility and the paying customers from the beginning – have seen their businesses hollowed out or destroyed so quickly?

I am happy to admit that I too did not see the full implications of many of these innovations at the outset. But I did recognise that their effects would be dramatic, and that the only solution was to start working with the new technologies as rapidly as I could. In 1979, a forward-looking maths teacher by the name of Ian Soutar insisted that my school purchase a Tandy TRS 80 (the personal computer before the PC was invented). Although the cost was extraordinary, it seeded the knowledge that computers could do amazing things and an instinct that they would change the world.

So when I arrived in my first office job, I knew that I should grab the first desktop PC that I could and use it to start automating basic working procedures. The first time around, there was no advantage beyond rather neater output than my unimpressive handwriting. But each time I repeated a task, I found an immediate time saving of at least 80%.

Despite this, to be really brutal, even today there are some well known businesses in sectors such as technology and digital media that have still not grappled with the profound changes to the environment in which they are operating. These companies insist on trying to recreate their old business models in the new world, and simply cannot let go of the status quo. They resemble nothing so



much as a poisoned insect lying twitching on the floor, still unaware of its own certain impending death.

So, be warned!

One of the most significant revolutions of the last 200 years is under way, right now. It will transform the structures and economics of many of the world's greatest industries. From agriculture to construction to mining to transport, many sectors will be

“With all this noise and distraction, it has become increasingly hard for rational perspective and objective analysis to cut through the sticky tar of public discussion.”

completely reshaped. Activities which today are technically and economically unthinkable will become the daily norm. From the centre of New York to the wilderness of Africa, some aspects of today's world will be absolutely unrecognisable within ten years.

This revolution will destroy hundreds of the world's largest companies, and hundreds of billions of dollars of shareholder value. It will also create hundreds of new industry leaders, collectively worth trillions of dollars. As in previous revolutions, the incumbents will be best placed to win as the new commercial world order takes hold. But thanks to complacency, arrogance or wilful ignorance – all symptoms of what Cassandra Kelly calls the supremacy gene – many will follow once great companies like Kodak and Nokia into corporate oblivion. Happily some of the new

businesses already exist today, meaning that those investors who are ready to look up from the mouse wheel of the status quo and look out into the future will be able to achieve extraordinary financial returns.

So, what is this revolution? You may be surprised to know that I am not talking about big data (despite its amazing potential), nor the extraordinary revolutions which will be seen in healthcare over the coming decade, nor the mind-bending potential of ubiquitous low cost 3D printing. Nor am I thinking of

the ongoing revolutions in mobile computing, social networking, the internet of things or open systems and open data. I am, of course, referring to the Energy Revolution. Readers of Pottinger Perspectives will recognise this theme, but the dramatic changes that are hard upon us are so great that we have felt compelled to write about them in more detail.

Much of the debate in relation to changing the way in which the world uses its resources has been a highly vexed one. Passionate and persuasive arguments have been put forward by academics and businesses and politicians around the world. Whilst some are clearly motivated by trying to encourage a more far-sighted, thoughtful approach to decision-making, others represent more subtle attempts to shift how people think,

Don't Think of An Elephant style. Quite a few, however, have been nothing more than self-serving attempts to occupy the limelight, by representing more controversial views, all too often for immediate personal gain. And, in numerous countries around the world, some of the political discourse has been even worse.

With all this noise and distraction, it has become increasingly hard for rational perspective and objective analysis to cut through the sticky tar of public discussion. So it is time to try a little magic instead. As we all know, if you are trying to see through an illusion and understand what is really going on, you must ignore the hyperbole and flashy distraction and instead watch the hands very, very closely. There are three particular sets of hands that are especially instructive to watch – the silent hands of pure economics, the rough hands of the world's largest mining companies, and the powerful and determined hands of China's long term planners.

The practical economics of power in the 21st century

For thousands of years, mankind has derived energy for heat, transportation and industrial processes from fossil fuels. Starting with the wood that was used for the cave-dweller's campfire, mankind progressed to using peat and coal in early metal refinery. Some 4000 years ago, oil was discovered, and was originally used for purposes such as lighting. Following the invention of the internal combustion engine, it came to provide a highly transportable, energy-rich fuel critical to the birth of the automotive industry, supported by long and complex supply



chains that wind their way around the globe. The advent of electricity networks allowed power generation to be centralised, in very large, very efficient power stations. Almost overnight, electricity could be distributed over long distances, bringing heat and light to most homes in the developed world.

Mankind also discovered that both wind and water could be used to generate energy as well. For thousands of years, these have been used to drive mills that grind grains into flour. And since the late nineteenth century, hydro-electric power generation has been the norm in countries such as Spain and Sweden where water flows are plentiful.

But as the decades have passed, fossil fuels have had to be extracted in more and more challenging locations, using more and more complex extraction processes. As an example, most new gas supplies coming on stream are either from very deep below the ocean, or involve the extraction of gas from coal seams and shale beds. Exactly as predicted by the Hubbert curve, these sources have become steadily more expensive. As a result, the cost of crude oil has risen at an underlying rate of around 4% to 6% a year over the last century or so. Although the technology for extracting energy from fossil fuels has improved, we are already close to theoretical limits, and further gains have come at a rate of only 1% to 2% a year.

In very stark contrast to this, the cost of energy from renewable energy sources has declined substantially over the last 100 years. This reflects dramatic increases in the efficiency of technologies such as solar panels and battery storage. Pottinger

estimates that the cost of energy from solar PV has halved approximately every seven years since the 1960s (with more rapid reductions in recent years). Meanwhile, over recent times the cost of battery storage has been halving every 18 to 20 months. Importantly, there is still a considerable way for these technologies to improve before theoretical limits are reached, meaning that further step-changes in capability remain



Pottinger COO Pedro Perez shows off his Model S grin

probable over the near to medium term.

These two curves – the upward-sloping cost of energy from fossil fuel sources, and the downward-sloping cost of energy from renewable sources – are about to intersect. Indeed in remote locations with reasonable amounts of sunshine, this has already happened, with solar PV now materially cheaper than traditional sources such as diesel fuel. This explains the increasingly widespread use of renewable power in

remote resource-mining communities and pacific islands, as well as other locations that are far from existing grid connections. The high rate of change in relative pricing means that the boundaries that define where conventional, grid-sourced power remains cheaper than renewable alternatives are moving rapidly. Our own analysis suggests that it will be cheaper to move off grid in downtown Sydney – with a solar + battery system installed by some of the world's most expensive electricians – by as soon as the end of 2015.

In sunny countries, this means that campaigners for urgent action on climate change can simply encourage consumers to buy cheaper energy (from renewable sources). This is a powerful win-win outcome for consumers, combining clean energy with lower cost. This is clean, reliable, affordable power at its best. In addition, access to power will no longer be dependent on highly capital intensive electricity transmission and distribution networks. This will dramatically reduce the overall end to end cost of connecting users with the power they need.

Combine this with electric vehicles and consumers can be set free from another enormously complex and expensive supply chain – the one that brings petrol to within easy reach of their homes. With Tesla's all-electric Model S now offering some 300 miles of range, it can be combined with a sufficiently large solar array to offer complete independence from fossil fuels. Remember how expensive petrol is in remote locations, and the attractiveness of this proposition becomes very clear.



Of course, all of this is not a true benchmark of the overall cost of solar energy systems, as it compares a self-sufficient solar installation with the cost of generating and delivering power over electricity networks that have already been built. Where consumers are not already connected to the grid – and where they will have to bear the cost of creating that initial connection, the price differential between solar + battery and power from the grid becomes even more dramatic. One simple way to measure this difference is in the number of power poles that you have to buy before grid power is priced out of the market. In Australia (with those very expensive electricians) the number is something like three poles. So anyone who is building a new house that is located far from the grid should already be choosing power independence on purely economic grounds.

All of this is of critical importance to emerging nations, including in Africa, where there is little power distribution infrastructure outside the larger conurbations. Delivery of power to these energy deserts is becoming cheaper and cheaper. Importantly, it can be delivered a few kilowatts at a time, as and when funds allow. Whilst the absolute costs of power in any form remains too high for many people, the ability to pursue individual projects community by community at a cost of a few thousands of dollars each offers intriguing potential for change that is both incremental and transformational.

As one example, Pottinger alumni Annabel Chauncey founded School For Life in 2008. The school provides education and a home for severely disadvantaged children in Uganda. From the outset, it has been run

with a vision that the school must become sustainable as a first priority. Whilst donors may find it more appealing to build new schools rather than ensuring that the existing school can run forever, the founders have focussed on building a symbiotic relationship with the community, and building an endowment to ensure that every child that starts their education at School For Life can

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complete it. As the cost of solar energy fell, in 2011 the school was able to install solar panels to provide electric power, along with battery storage so that this could be used so that the children had decent light to read in the evenings – a tiny investment that will change the lives of thousands of children over the decades ahead.

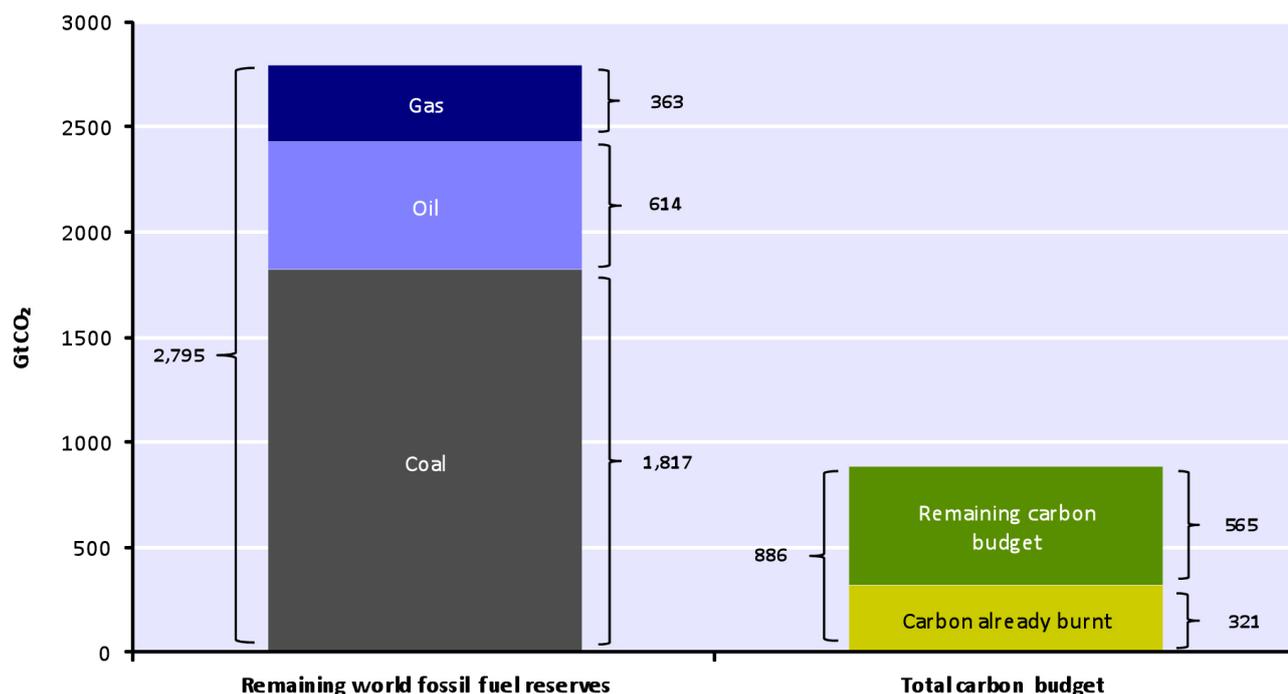
This is a beautiful and romantic story, which

illustrates very clearly the incredible changes that will be wrought by the Energy Revolution. Remote communities, which could never have afforded to buy a weekly supply of diesel, shipped expensively by tanker hundreds or thousands of miles across country, can be given light for decades via a single, relatively modest investment. Extraordinary.

Most to lose, or most to gain?

The world's largest resources companies are often thought to have the most to lose should the world start to take strong action on climate change. In particular, the leaders of companies or indeed countries whose fortunes are highly dependent on coal or oil will feel particularly threatened by campaigners who are seeking to limit global carbon dioxide emissions. We have already seen this play out at the recent G20 meetings in Brisbane – just a small foretaste of the drama to come.

The stakes in this game are very, very high, in both a financial and reputational sense. Over the next decade, at most, the rules of the energy game will be dramatically rewritten, as the cost of solar energy continues to fall. In parallel, it is increasingly likely that major nations will take action to encourage transition to these newer, cleaner and cheaper sources of energy. Whether this is driven by public concerns relating to climate change, or environmental impact, or simply economics, does not matter at all. What does matter is that, during this incredibly dynamic period, leaders of businesses, governments and investment funds must exercise their judgement as to how to invest their commercial, financial

Figure 1: Comparison of the global 2°C carbon budget with fossil fuel reserves CO₂ emissions potential

Source: Carbon Tracker, 2014, *Unburnable Carbon – Are the world's financial markets carrying a carbon bubble?*

and political capital in the face of dramatic, impending change.

As with previous revolutions, the impacts of the Energy Revolution will be felt far more rapidly than many leaders anticipate at the outset. As a result, the quality of their decisions will be revealed with exciting (or terrifying) rapidity. In the business sector, it is already clear that the motor companies which do not have a well established electric vehicle programme are in terrible trouble. They are fortunate indeed that Tesla's ambitions lie in reshaping the whole motor industry, not just winning for themselves – Tesla Motors has made its entire patent portfolio accessible by its competitors for no charge, so long as the companies concerned are genuinely committed to building electric vehicles.

Meanwhile, around the world, many incumbent electricity generation, distribution and retailing companies continue to spin their wheels grappling with whether, when and how to adjust their strategies in the light of these "new emerging trends". I use quotes, as these trends have been in place for decades – it is merely the cross-over point that is now upon us, like a fast train approaching a sleepy country station.

And what of petrol retailing? Electric vehicle ranges now reach 300 miles – more than even the typical urban taxi driver covers in a day, making hybrid vehicles and battery switching stations obsolete. In the US, only 1% of journeys are more than 100 miles in length – and Tesla has addressed even these by positioning quick recharge stations along the major long distance routes. These are,

of course, solar powered, and free for Tesla owners to use.

The voices of the past make a lot of the fact that it will take 20 minutes to part fill your Tesla's tank at one of these stations, compared to three or four minutes to fill a petrol tank completely. But if you are on a 400 mile journey, likely to last six to eight hours, which of the following would you choose? Would you opt for a single four minute stop, accompanied by a bill of \$50 to \$100 (depending on where you live). Or would you prefer a twenty minute stop, and perhaps a coffee and a light lunch, where the energy you need to complete your journey is provided for free?

This may be an interesting story, but let's remember that to understand the magic trick we need to focus on what the hands are doing and not get taken in by the rhetoric. In particular, how do the strategic actions of BHP and Rio, two of the world's largest resources companies, give a window on the minds of their respective boards and management teams?

In 2010, BHP attempted one of the largest ever hostile transactions in the history of the resources sector, when it launched a \$40 billion bid to acquire Potash Corporation of Canada. Potash is one of the key inputs to the world's agricultural sector, and one that will remain in increasing demand for the long term. In particular, the world population is set to grow by 32.4% to roughly 9.4 billion over the next 35 years. During this time, wealth effects will mean an increasing demand for proteins, particularly in the form of meat.

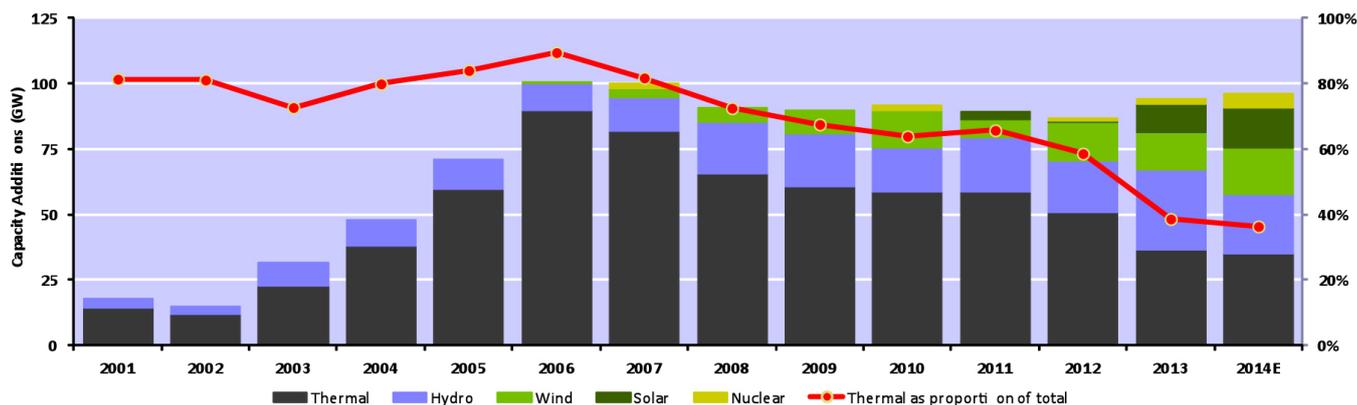
These are ultimately much more intensive to produce, with each kilo of beef requiring 5 to 7 kilos of grain as input. As a result, demand for agricultural output will increase by 70% over this period, forcing more land into agricultural production and driving greater demand for nutritional inputs such as potash.

Thus BHP's attempted acquisition represented a highly logical diversification of its extractive activities into a commodity that has strong underlying long term growth prospects and which has very little exposure to the risks of fossil fuels. Although few commented on this at the time, the proposed deal was clearly an investment in a higher growth, lower carbon area of resources.

Meanwhile, in 2013, Rio announced that it proposed to exit part of its aluminium refining activities. In thinking about the strategic logic, remember that the process by which aluminium is refined is a highly energy intensive one, requiring large amounts of electrical energy. The proposed sale included the Gove refinery in Northern Australia and the assets of Rio's Pacific Aluminium business including smelter operations in Australia and New Zealand. Although the company made no mention of this in its initial press release, it is very interesting to note that the facilities to be sold were largely powered by fossil fuel sources. Meanwhile the refineries to be retained were almost entirely powered by hydro-electric power.

Once again, although few commented on this at the time, to Pottinger the proposed deal was clearly and simply a divestment driven by ensuring long run competitiveness

Figure 2: Additional power capacity by energy source in China 2001-2014



Source: The Climate Institute

and reduced risk by eliminating dependence on fossil fuels and the associated carbon pricing risks.

It is easy to identify the significant downside risks to these companies of any reduction in world demand for fossil fuels, whether in the form of coal or oil. Globally, this theme has been played out in financial markets over recent years, with the share prices of coal companies and oil companies having fallen substantially even at a time when the underlying resource prices have been very high. Simple comparisons which equate the proportion of existing reserves which are monetised with the end-state impact on global temperatures have focussed minds on the likelihood that a decent proportion of existing reserves will never be extracted. The relevant figures are set out below.

Nevertheless these incumbents need not be the losers in a transition to a low carbon economy (although many, of their own volition, will be). These companies have enormous financial resources, which can be accessed by cutting back heavily on exploration and development expenditure, and extracting cash from their existing mines. These huge cash flows can be redirected away from investment in fossil fuels to investment in other mining activities (potash!) or investment in other energy sources. As I write this note, Rio has announced a strategy almost exactly along these lines.

These strategic conclusions play out most clearly amongst the larger, diversified resources companies, whose value rests principally on existing producing mines. For exploration and development companies, that have secured prospective mines that have not been brought into production, the future is much bleaker. To bring these projects to life, these companies will require significant equity raisings, accompanied by large debt facilities, to finance the billion dollar cost of building the infrastructure required to commence production. Many of the world's largest lending banks – including HSBC, Citi and Deutsche – have become enormously

more wary of such projects, and the risk that demand for output may fall materially within the multi-decadal life of the projects in question.

Just as businesses and financial institutions have become more sophisticated over the decades, so too have environmental campaigners. Organisations such as 350.org have looked out beyond their immediate concerns with environmental sustainability and focussed on the financing of major new projects. Whilst part of their strategy is simply to focus public interest and emotion on issues of the global environment, the razor sharp focus on financing flows is highly sophisticated.

Over the last few years, many of the world's largest investment banks have published research on the relative oversupply of fossil fuel resources, compared to likely demand as a transition is made to renewable energy (whether for environmental or cost reasons). This has increased awareness of these issues in the financial community, and given credit officers something new to think about. Long term debt facilities are critical for most resources companies when they are seeking to finance a major new development, the cost of which may run to billions or even tens of billions of dollars. Without debt, rates of return will be depressed, and large, dilutive equity raisings may be required.

The challenge for lenders is that, in advancing such loans, they have to look a long way into the future. In particular, if the loan in question cannot be repaid out of cash flows during the life of the loan, the lender needs to be extremely confident that the loan will be able to be refinanced in due course. This forces consideration of likely cash flows, not just in the first five to ten years of a project, but the decade after that as well. Given the highly dynamic nature of world energy markets, financing large coal-related projects has become enormously more challenging.

The Great Wall of renewables

In any discussion of adaption to climate

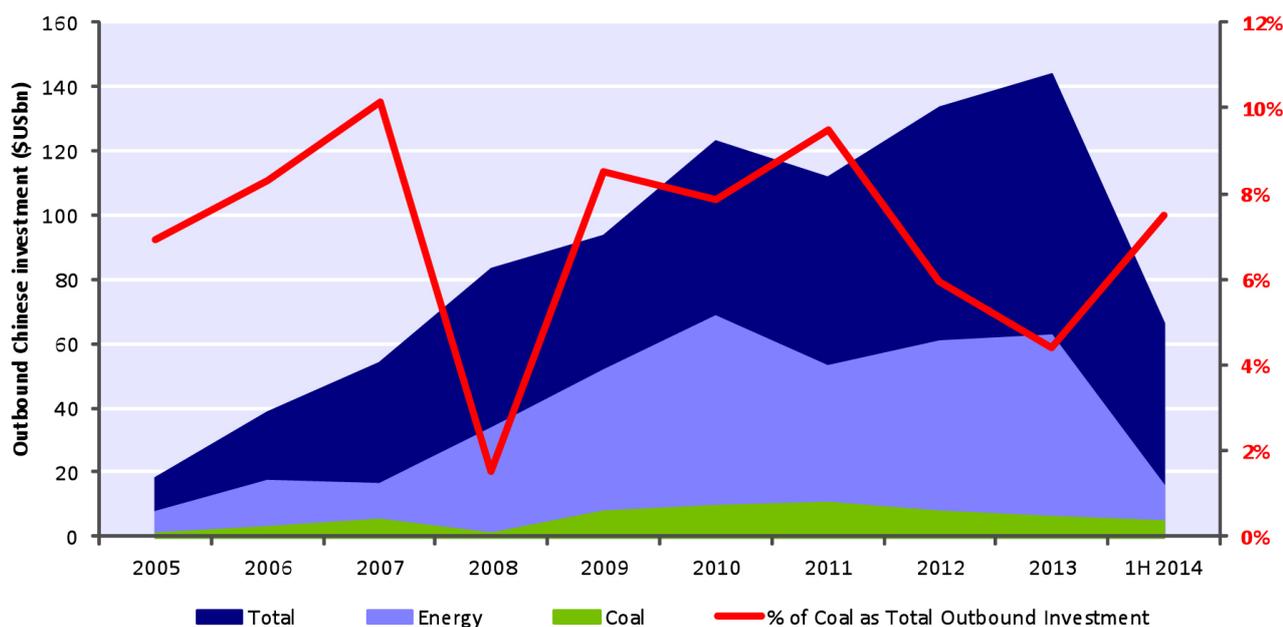
change, and reducing dependence on fossil fuels, attention rapidly focuses on the role of China. The country is undergoing a period of extremely rapid industrialisation, urbanisation and wealth generation, which translates into huge increases in the demand for power. As one of the world's most populous nations, it will soon have amongst the largest demand for energy of any country, placing it at centre stage in the transition to renewable energy.

With this in mind, it is interesting to look at the strategic initiatives that China has undertaken to position itself for a world powered by renewable energy. It is already the leading provider of solar panels, and number two in wind power. Indeed, whilst much has been made of China's "irrationality" in driving the cost of solar panels down over the last couple of years, a long term thinker might see this as a modest short term investment in order to own the manufacture of the world's primary source of power for the next 50 to 100 years.

Meanwhile, over the last three years, China has invested heavily in the development of the thorium nuclear power cycle – the next generation of nuclear power that offers much lower risks and much less environmentally dangerous radioactive by-products. Originally developed at Oak Ridge in the US at the same time as uranium cycle nuclear power, the latter was chosen as it offered the ability to manufacture nuclear weapons. A similar programme is under way in the United States, led by Fluor Energy. We are watching both programmes with great interest.

Much is also made in the West of the number of new coal-fired power stations that China is building. Such commentators very rarely make any mention of the amount of renewable energy capacity being installed or the number of nuclear power stations under construction, let alone the overall mix of power generation capacity being added by China. Indeed I suspect a number of such writers have no idea of these figures at all. As ever, the numbers are telling, and provide intriguing evidence of China's long term plans. The chart below shows the composition

Figure 3: Outbound Chinese Investment – Total, Energy and Coal – 2005 - 1H 2014



Source: The Heritage Foundation, China Global Investment Tracker, 2005 - 1H 2014. Note that "Energy" investments include oil, gas, coal, alternative, utilities and renewable energy investments

of new power capacity added in China over the last fourteen years. It's important to remember how these years match up with the nation's five year plans. The figures show very clearly that, over the last five year period to 2012, new coal fired plants represented 60% of overall capacity added, and that this fell from 80% in the previous period. The current period reflects just 40% investment in coal, and it seems entirely probable that in the subsequent period this figure will fall further. Certainly by 2025, China should begin to have functional thorium nuclear power technology available to provide baseload power, offering the intriguing prospect that it can begin to replace older coal-fired power stations with zero emission thorium generators, re-using grid connections to keep costs down.

Before we get too caught up in all this, let's go back to the magic trick and look again at how the hands are moving. In particular, how has China invested money offshore over the last decade or so? There has been plenty of well advertised investment in property and agriculture and the key resources required to support China's economic growth. But how much investment has there been in fossil fuels and coal? In other words, let's ignore the loud mouths of expert and inexpert commentators around the world, and look at where the money is going.

If the answer surprises you, then your advisers have not been doing the right homework. Over the last decade, Chinese organisations have invested approximately \$1.1trn in acquiring businesses and assets offshore. This includes investments by both state owned enterprises and private

companies, as captured in the Heritage Foundation's China Global Investment Tracker. Of this, approximately \$444bn or 51% has been invested in transportation, metals, property, technology, agriculture and finance. Meanwhile, only \$59bn, or just 7%, has been invested in coal. To put this into context, over the same period, BHP and Rio have together spent more than \$215bn on capital expenditure.

And if you look just at M&A transactions, the figures are even more telling. Investment in all types of energy has fallen from some 70% of all outbound M&A from China in 2005 to just 10% or so in the last couple of years.

If China thought that it had a long term need for coal from offshore, surely you would expect to see it acquire businesses to ensure supplies over the long term? The acid test of this interest will come in the year ahead, with many coal company share prices at the lowest levels they have been for some time. For the record, our own expectation is that China will continue to focus the vast majority of its resources on other areas, for environmental, social and economic reasons.

An electric shock for pension fund trustees

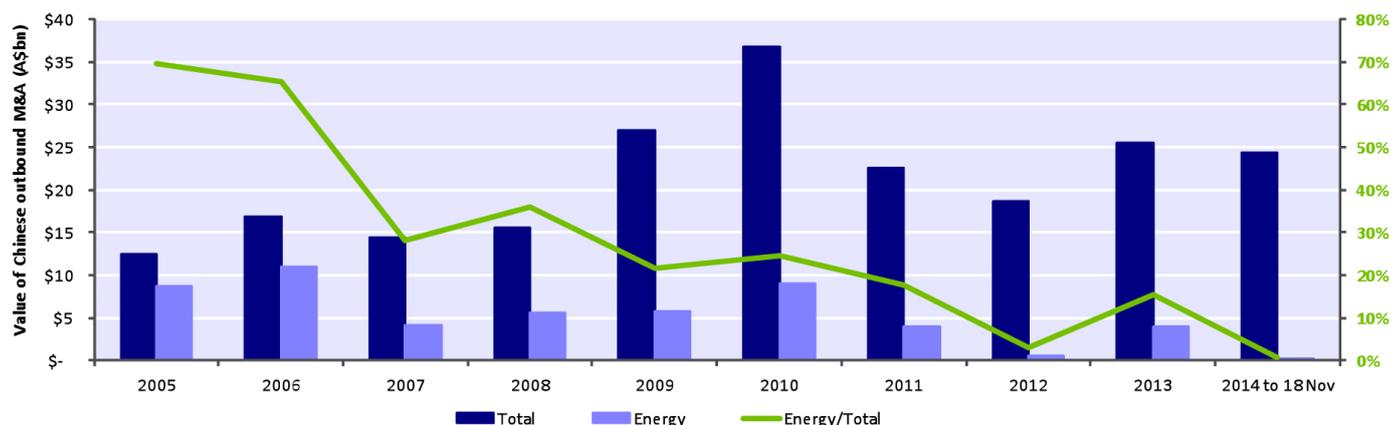
All of the above raises some very significant issues for long term investors, not to mention the boards of trustees that oversee pension funds. There is now an extensive body of scientific opinion in relation to the likely path of global warming, and its implications for the planet. If the scientists are right, governments will be forced to begin to take much stronger and more direct action on climate change

within the next five to ten years. These actions will necessarily be detrimental to the financial interests of owners of companies that are high emitters of carbon dioxide, and in particular to the resources companies that provide the fossil fuel inputs. But, as I've shown earlier in this story, these actions may not be detrimental to the interests of consumers or economies at all. Indeed these new sources of energy will have much lower environmental impact and will be cheaper than alternative fossil fuel sources in the near future. Critically for emerging nations, they can be built a few kilowatts of capacity at a time, with no need for massive up front investment in centralised generation, not to mention electricity transmission and distribution networks and associated load balancing systems.

There is also extensive long run evidence that the costs of renewable energy is falling, and that the cost of fossil fuel power sources is rising. As I've described above, this means that solar energy is rapidly becoming competitive with grid power without the need for any type of subsidy at all. The Energy Revolution will drive dramatic shifts in value between old world companies and new world companies – and to judge by the past, many of the former will not make the transition successfully.

This creates some very asymmetrical risks those who are custodians of other people's money. If you make asset allocation decisions to reduce exposure to fossil fuels and related businesses, you will be able to justify your decision with reference to a large body of scientific opinion. And, at an anecdotal level,

Figure 4: Value of Completed Outbound Chinese M&A deals – 2005 – 18 November 2014



Source: CapitalIQ, Pottinger analysis. Note that "Energy" investments include oil, gas and consumable fuels

you can also reassure yourself that you are following the same path as Harvard and the Rockefellers. On the other hand, if you dismiss these issues and make investments which turn out to be a financial disaster, how forgiving will unit-holders be? These risks are no longer just related to climate change considerations – they are also being driven by pure economics. With literally trillions of dollars invested in fossil fuels, twentieth century energy systems and the associated twentieth century supply chain, I can only imagine that class action litigators and their funders are looking forward to a bumper decade.

On the other hand, if low cost carbon capture and storage or other technologies or unexpected inventions extend the life of fossil fuels, then those who invested away from this trend will have had solid basis for their decision. In this context, it is worth noting that the world's largest coal, oil and gas companies have invested massively more money in exploration and development than they have in supporting the development and commercialisation of carbon capture and storage. Once again, the hands tell a story.

Ultimately, whatever your personal views on the likely path of value or creation or destruction may emerge from the Energy Revolution, the position of investment company trustees will be an exceptionally uncomfortable one. Their only solution is to look very hard at the future, and the economic and other factors which are driving these changes. As I have said to many people in the last few months, if you are still operating in the present, it's time to change your watch. Where to from here?

As with magic, even if you watch the hands very carefully, it can be very challenging to understand what is really going on, or indeed how the show will end. In commerce, finance

and government policy, the biggest challenge is that the entire decision-making paradigm employed around the world is not well suited to making sense of dramatic inflexion points. Financial markets judge performance quarter by quarter and electoral cycles come around all too quickly. Meanwhile even the apparent rigour of discounted cash flow models focuses attention on the first five to ten years of any project and is slavishly based on base case assumptions which rarely, if ever, turn out to be exactly right. It is precisely this unthinking emphasis on near term outcomes which explains why large incumbents in industries undergoing revolutionary change have been so singularly unsuccessful in riding the waves of innovation that have occurred decade by decade over the last hundred years.

There are many examples of these failures, and the increasing pace of change and growing complexity only increase the risks that decisions made with a focus on the expediency of short term outcomes will turn into financial disasters in years and not decades. There are, happily, both qualitative and quantitative answers to these challenges, as I have outlined in *The Long Term Starts Tomorrow* (available online, in forward-looking bookshops, and from Pottinger).

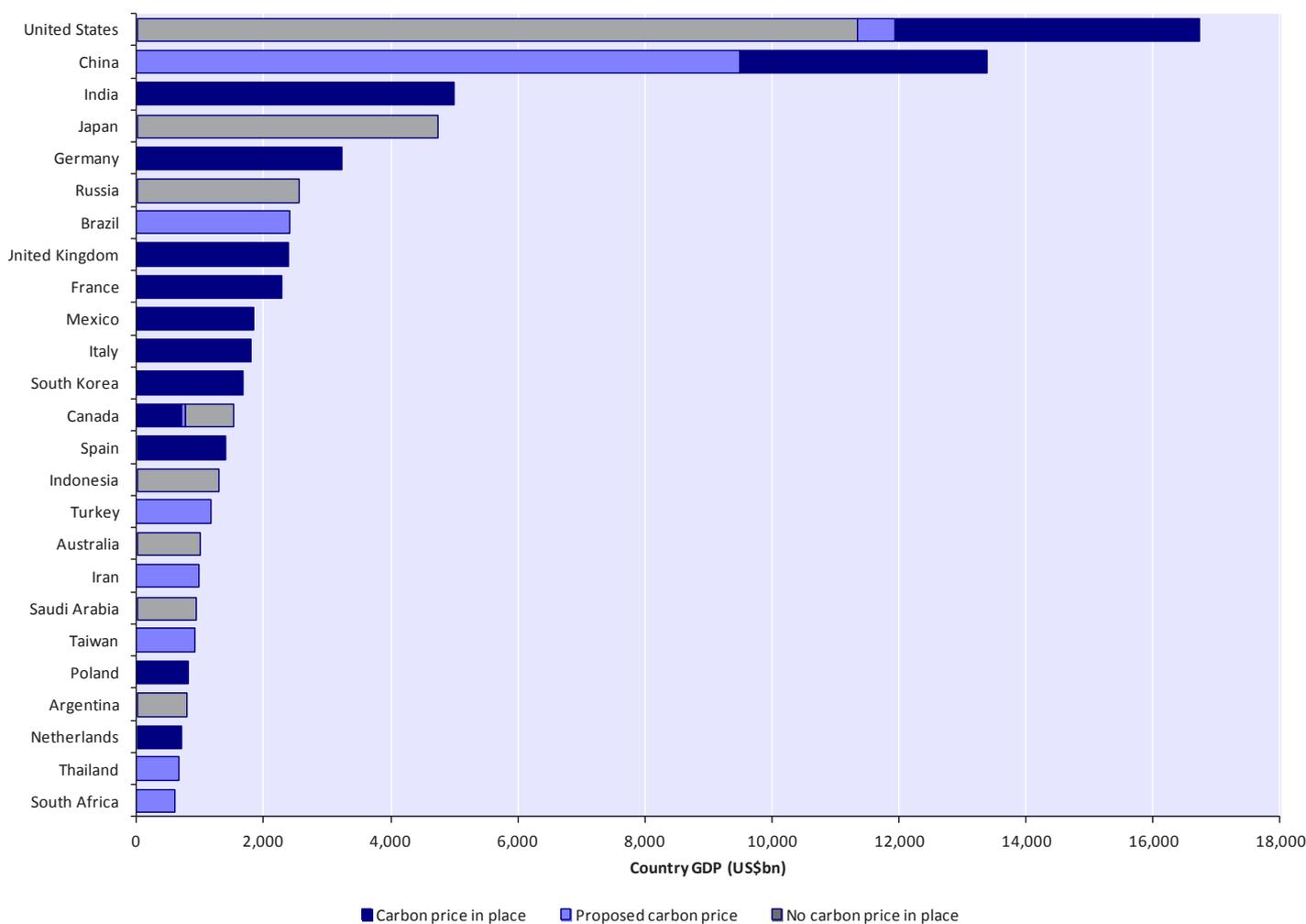
Whatever your views on climate change, environmental sustainability and the long term future of our jewel planet, the choices for companies and investors and governments are simple to enunciate. You can face up to the implications of what we see as a fast approaching inflexion point in world energy systems, and take decisions, make investments and set policy to prosper once the revolution takes hold. Or you can bet against a tsunami of change that will have implications that reach far beyond what we can see clearly today.

Over the very short term, the latter may prove effective – so long as investors and voters don't see the short-comings of your strategy. But the lessons of the last century are very clear. The innovators will be carried far further and higher and faster by the wave of innovation than is imaginable as the wave begins to rise.

As Mike Baird commented on my book: "Whether in Government or business, the daily challenge is how to deal with the short term crisis whilst balancing long term needs? Nigel Lake provides a clear framework to address this challenge whilst also detailing the need to change to survive on any journey. Change involves risk however it also may be the very reason that you remain in your job. A must for any manager, leader or Minister - compelling reading." At a deeper level, the Energy Revolution will mark a turning-point in corporate fortunes with implications far beyond the industries that are immediate impacted. Long-established companies, with old traditions and backward looking decision-making have been some of the biggest losers of the last decade.

In absolute contrast to this, the RedBull revolutionaries from Silicon Valley have been some of the biggest winners in the last fifteen years. Over this time, the top twenty technology companies (many of them founded by college graduates and dropouts) have created nearly two trillion dollars of value. They achieved this extraordinary feat at a time when the world is changing more and more and more rapidly. This is a one way shift which will never, ever be reversed. To put this into perspective, the agricultural revolution lasted nearly two centuries. Smart phones have revolutionised the lives of billions of people in the seven short years since the iPhone was born. Today, a global leader can be built in a few years. So can whole new

Figure 5: Carbon prices in the largest 25 countries by GDP (PPP)



industries.

To win in this new paradigm, boards and management teams need to embrace new ways of thinking about strategy. They need to harness decision-making frameworks that can deal with inflexion points in a quantitative and robust manner. They need to cast off the shackles of the status quo and realise that doing things the same is no longer a safer option than doing things differently. The devil you know is no longer your friend – he is the smiling assassin who will kill you and your company silently in the night.

Meanwhile, the individuals who have the courage to look up from the pavement, reach out into the future and grasp the opportunities that radical change and innovation offer will be the iconic leaders of tomorrow. These people must rise up and grapple with this challenge, both individually and collectively. Because if the long term really does start tomorrow, we'd better start doing something about it today.

In relation to energy, most major countries are already well ahead. Most of the top

twenty five countries have opted for market-based mechanisms to tip the playing field just a little in favour of the future. And even in the US and Canada, where national schemes are yet to be implemented, State-based schemes cover a significant part of the economy. Contrary to many reports, Australia has not yet entirely abandoned its carbon-pricing scheme. Rather the price has been set to zero, leaving the door open for a price to be reintroduced should the political climate change.

Of all the world's major countries, the barriers to riding the wave of innovation that the Energy Revolution will bring are greatest in Australia. The sophistication of the debate on these issues has, frankly, been at best short-sighted, and at worst both ignorant and irresponsible. It is now critical that leaders in both business and government leave their prejudices at the door, and address how their businesses and regions can maximise the economic and social benefits that will flow from the new economics of power.

Meanwhile, those that have campaigned to raise awareness of the issues over the last four decades, whether in academia or business, companies or government, should declare a one time amnesty in December 2014. Those that accept this offer must pledge to make decisions that create transformational opportunities in the future, rather than those which defend the status quo.

Ultimately, the Energy Revolution will create the most profound opportunities for outperformance and underperformance of any area of innovation over the decade globally. This bold claim reflects the simple facts that more value is tied up in the energy value chain than in any other part of the world's economy, and the economic forces now at work are creating an extraordinarily dynamic environment. This makes it the single biggest opportunity to win or lose for the many, many businesses that operate somewhere along that value chain. **P**

By Nigel Lake

Last issue of Pottinger Perspectives:



Many inventions, businesses and cities owe their genesis to pure luck – the chance encounters or apocryphal apples falling from trees that have no relevance to the modern world.

Many of the greatest cities lie on river estuaries, reflecting nothing more than the basic human need for drinking water and safe harbour for an explorer's sailing boat. In contrast, we now have an unprecedented opportunity to take control of our future in ways that have never been possible before. If business leaders and politicians have the courage to think long term, they can have dramatic impact on the everyday lives of ordinary people, leaving a legacy to rival that of Bradfield, Columbus and Darwin. This does not require a leap into the unknown. Demographic trends are reliable over long timescales and rich data on many aspects of our lives can be readily aspects. This means that many aspects of the future can be predicted with relatively high precision.

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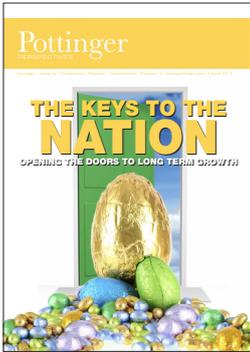
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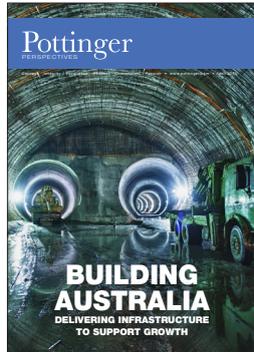
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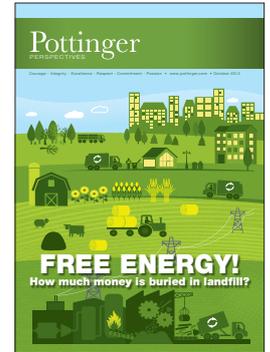
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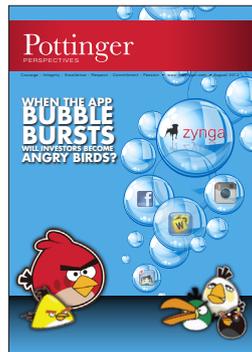
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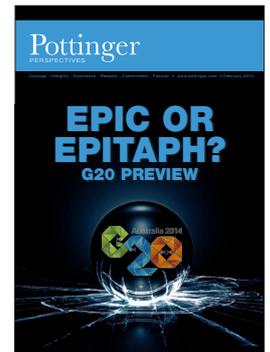
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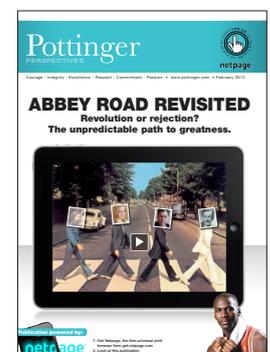
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