



Riding the resources cycle: the outlook for the Australian resources and energy sector

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Alternative text: Title page. Riding the resources cycle: the outlook for the Australian resources and the energy sector.

As any seasoned cyclist knows, the most challenging aspect of cycling to master is not the ascent, but the decline. It takes a cool head, good judgement and good vision to navigate twists and turns at high speed – and avoid the potholes.

Between 2000 and mid-2011, the commodity price index rose by a factor of five. Copper prices increased by 342 per cent and iron ore prices by 758 per cent. A price shock of this magnitude has tremendous implications, not just for the resources and energy sectors, but also for the other sectors of the economy. I want to spend some time looking at those implications, and at how well the Australian economy is positioned for the descent.

Perhaps the most important implication is that Australia's export profile has altered markedly. First, we are exporting more but our global share of exports is falling. Second, while we have become global export leaders in iron ore,



coal and LNG our export profile has become less diverse than it already was prior to the ascent in prices. Australia has one of the least diverse export profiles among developed countries.

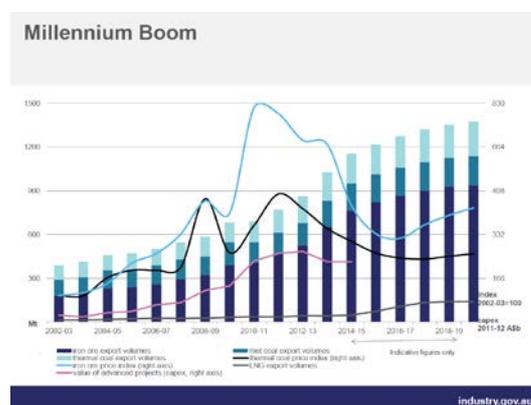
What of the outlook? Across the commodities basket, volume increases are expected to outweigh price decreases, such that export earnings increase by around one third through to 2019-20. There is uncertainty around these forecasts, on both the volume and price side – as there always is in forecasting through a super-cycle.

From a policy perspective, to mitigate the risk that the forecast earnings from resources and energy exports might not be realised, we would want to see other sectors opening up new export markets and connecting into global supply chains.

Some of this will naturally occur as a result of enhanced price competitiveness through a lower real exchange rate. The rest will need to occur through concerted effort by business and government.

I will commence by examining the “millennium boom” through its three phases – the price boom, the investment boom and, now, the production boom – and examine the implications for output, employment and exports in the resources and energy sectors and in other sectors. I will then run through how we see the resources and energy outlook panning out over the next five years. I conclude by looking at some of the policy issues surrounding diversity in the Australian economy.

Millennium boom



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Millennium Boom:

Alternative text: Iron ore and thermal coal prices peaked around 2011-12, this coincided with high investment in resources projects (just before peak investment). This was during the construction phase of the boom. Now that we are in the production phase we project capital investment to drop off and prices to decline from peak but export volumes of thermal coal, iron ore and LNG from Australia to continue to increase over the outlook period to 2019-20.

The period of high commodity prices was underpinned by three factors. First, was rapid growth in China as its construction activity and industrial output accelerated after 2001. Second, investment activity was initially slow to respond. Third, quantitative easing in the US has prompted a depreciation of the US dollar against most currencies. As commodities are generally traded in US dollars, prices have increased to account for the fall in the US dollar against the currencies of countries that produce them. These three factors have now started to unwind. Prices of most commodities peaked by 2011.

In response to high commodity prices, there was heavy investment in developing new production facilities, albeit with a lag. Australia was a key destination for much of this capital flow due to its high quality deposits, stable government and close proximity to the market that would absorb much of the new production.

Over the period 2003 to 2014, over \$400 billion of resources projects were initiated in Australia. Business investment peaked in the last quarter of 2012 at an astonishing 19 per cent of GDP.

The investments undertaken in the past five years, both in Australia and abroad, have resulted in a surge in the availability of most commodities. This has coincided with a slowdown in consumption growth rates such that most markets are now oversupplied, sending commodity prices into a downward spiral. With mining profits falling in 2014, resources companies now have a renewed focus on reducing costs and improving productivity.

Now that we are in the third phase of the boom, the production phase, where does the Australian economy overall stand? It is, of course, much larger, up by 50 per cent – but it has also seen significant structural change as a result



of relative prices driving resource reallocation across the economy. It is not only the exchange rate that has driven this reallocation, but also relative wages which attracted floods of workers – and migrants – into Western Australia, Queensland and the Northern Territory.

At the start of the millennium, manufacturing output in Australia was one third larger than mining. The crossover, when mining output became greater than manufacturing output, happened in 2011. By the end of 2014, the ratios had completely swapped, with mining output one third larger than manufacturing.

On the employment side, mining is far more capital intensive than manufacturing and employs relatively few people, around 2 per cent of the Australian workforce.

At the start of the millennium there were over 13 manufacturing workers for every worker employed in mining. By the middle of 2013, this ratio had shrunk to 3.5, as the mining industry created more new jobs than were lost in manufacturing. Since then, employment has declined on trend terms in both industries.

On the export side, the resources sector has contributed strongly for many decades – but its contribution has ramped up since the start of the boom. In 2000, exports from resources contributed 10.6 per cent of GDP. By the end of 2014, this had risen to 12.5 per cent. In contrast, exports of the rural sector and manufacturing both shrank as a share of GDP over the period, from a combined 4.8 per cent to 4.3 per cent. I will return to this issue of exports after examining more closely the resources and energy outlook – based largely on the March *Resources and Energy Quarterly*, our most recent five year outlook.

Outlook

A general impression, easy to form at the moment, is that the boom is over. We reckon this is wrong: the production phase of the boom is just starting for Australia. Whereas the high price phase lasted for around 8 years and the investment phase about 6, the production phase is set to last far longer.

Economic growth in the highly populated emerging economies of Asia will continue to be a defining theme of this century. Per capita consumption of energy and materials in most countries in Asia lags OECD nations by a large



margin and is almost certain to grow. As incomes rise, and they attract infrastructure and commercial investment, their resources consumption will grow by volumes that far exceed the efficiency gains among OECD nations.

Let me go into detail on individual commodities.

Steel and iron ore

Over the past decade China's steel production capacity tripled as large scale integrated steel mills were built across China. This changed in 2014 as policy directives have now halted the expansion of the steel industry and in some areas have closed older, high polluting facilities.

Despite this, China's steel production is still estimated to have reached a record 823 million tonnes in 2014. Most of this growth was increased *exports* of steel, up 50 per cent in 2014. Growth in China's steel exports is unlikely to be sustainable in the short term. A number of countries are now starting to resist further growth in steel imports from China and protect their domestic steel industries by establishing trade barriers.

Combined with expectations of quite low steel consumption growth in China in 2015, it is therefore likely that steel production will drop in the short term. Our view, though, is that this is not a structural decline. We project China's steel production to continue growing over the medium term to reach 895 million tonnes in 2020. This will be required for China to continue expanding its infrastructure networks, especially rail, build more housing and grow its capital stock.

India's steel industry is also primed for a period of expansion. The Indian Ministry of Steel has a target to increase steel production to 300 million tonnes by 2025, about 4 times higher than current production. Investment in new capacity is already underway, albeit at rates that make it doubtful the target will be met.

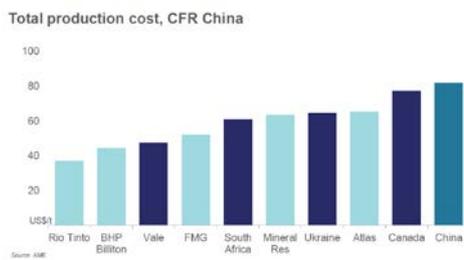
What does all this mean for Australia?

Iron ore prices have declined significantly over the past year. We forecast prices in 2015 and 2016 to remain low but to rebound over the medium term as higher cost producers exit the market and demand continues to grow.



Record Australian iron ore production, combined with slowing demand in China, has driven the iron ore price down to around US\$50 a tonne at the moment. Unlike previous years, the persistent fall in prices in 2014 was due to the market balance shifting to oversupply rather than the typical volatile pricing cycles associated with seasonal inventory build-up in China. This change in the market is proving difficult to analyse, as many of the price signals and historical market movements are no longer creating reliable pricing models. Our view is that market sentiment is driving prices rather than fundamentals.

Australian producers can deliver iron ore to China cheaper than anyone else



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Australian producers can deliver iron ore to China cheaper than anyone else:

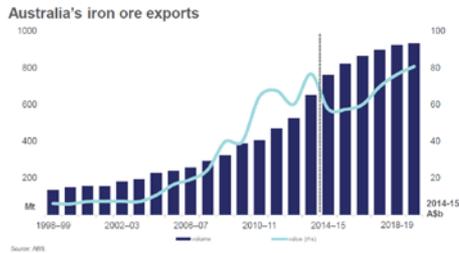
Alternative text: Rio Tinto and BHP Billiton, two of Australia's largest iron ore producers can produce and send iron ore to China cheaper than any other producer in the world. Total costs including production and cost of freight to China are the lowest in the world in Australia, with approximate costs for Rio Tinto US\$36.91 a tonne and US\$44.45 a tonne for BHP Billiton. China has the highest iron ore production costs at US\$81.85 a tonne.

China's appetite for iron ore has been so great in the past five years that it has been importing supplies from places like Iran, Africa, Ukraine and Chile. These higher cost producers are likely to be squeezed out of the market. They lack the level of political support of Chinese producers and do not have the financial resources to last a prolonged price downturn.

Australian producers are not immune either. We have already seen the mothballing of Atlas's mines in the Pilbara.



Increased volumes will support higher iron ore export earnings



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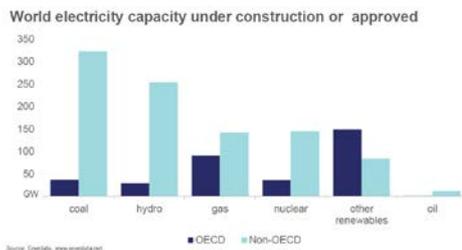
Increased volumes will support higher iron ore export earnings:

Alternative Text: Large producers such as Vale, Rio Tinto and BHP Billiton are all targeting higher production over the next five years and have significant cost advantages due to the scale of their operations and their superior ore grades. We forecast Australia's exports of iron ore to reach 935 million tonnes in 2019-20.

Coal

Coal is a hot topic at present. We believe coal market forecasts are being increasingly made on romantic scenarios of the future rather than through an informed process of evaluated investment in electricity generation.

Total world electricity capacity investment



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Total world electricity capacity investment:



Alternative Text: More than 300 GW of coal fired electricity generation capacity is under construction or has approval in Non-OECD economies. A little under 150GW of other renewable based electricity generation capacity is under construction or approved in OECD economies. A little under 150GW of gas fired electricity generation capacity is also under construction or approved in OECD economies.

The reality is the emerging economies of the world are increasingly investing in coal fired electricity generation to provide reliable supplies of electricity.

Barring major policy adjustments, we expect coal fired power to remain a primary source of generation in countries like India and China with a large volume of new coal-fired capacity under construction or approved. Due to the relative abundance, low-cost and geographic dispersion of coal resources, and the reliability of coal-fired technology, we expect demand for coal use to increase over the medium term.

China is projected to remain a major coal consumer, supported by the expected expansion of coal-fired capacity in regions in western and central China.

India's coal consumption is projected to increase rapidly over the medium term as its economy grows. Prime Minister Modi has announced the government's intention to ensure all Indian villages have 24 hour access to electricity.

India to become a key driver of growth in seaborne coal trade



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India to become a key driver of growth in coal seaborne trade:



Alternative Text: India has more than 150GW of coal fired power generation capacity operational. Another roughly 100GW of coal fired power generation capacity is under construction and more under approval. We project a large amount of the coal used in this power generation to be imported despite India planning to increase domestic coal production.

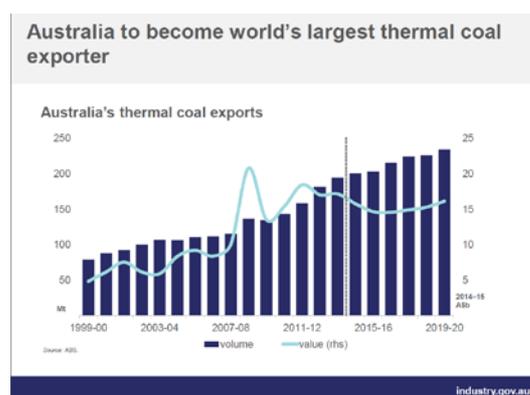
Coal-fired generation is a key component of this plan and there are 118 gigawatts of coal-fired capacity under construction or approved to start construction.

India has set some very ambitious targets for investment in renewable energy sources. However, this capacity is only a fraction of the investment in coal generators that is underway.

Despite plans to rapidly increase its own coal production, the pace of growth is not expected to be fast enough to meet the India's coal requirements over the medium term.

It is also worth noting the energy policies of other countries in Asia. Japan is increasing its coal fired generating capacity and electricity output following the shutdown of its nuclear power industry. South Korea and Taiwan are also increasing their coal, but Indonesia, Malaysia, Vietnam and Thailand are increasing their use by even more. Countries that have previously had low or no coal use in their energy mix in Asia have started to invest in new generators. This includes highly populated countries such as Bangladesh and Pakistan which currently have very low electricity consumption per person.

Australia's coal is likely to play an important role in meeting this demand growth, due to its higher energy content which makes it more suitable for use in the advanced generators that have higher thermal efficiency rates.





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Australia to become world's largest thermal coal exporter:

Alternative text: Australia's thermal coal exports are projected to increase over the outlook period to 2019-20. Export volumes are projected to reach 234.4 million tonnes and earnings of roughly A\$16.1 billion (in 2014-15 dollars) in 2019-20.

We forecast that Australia's exports of thermal coal will increase over the next five years, from around 200 million tonnes in 2014 to over 230 million tonnes in 2020.

Gas

After five years of tightness, the global LNG market is starting to re-balance due to more supply coming online. Because of high prices there has been much global investment in liquefaction capacity, much of it in Australia, which is now beginning to enter production.

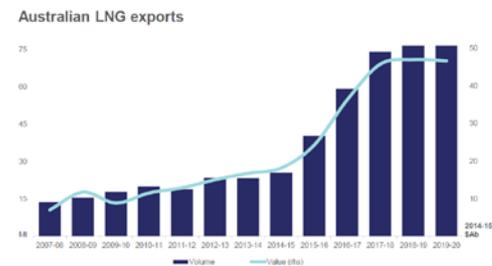
Japan is the world's largest importer of LNG receiving around 80 per cent of Australia's LNG exports. Japan relies on LNG to meet almost all domestic demand for gas. The majority of this gas supplies the electricity generation sector, as well as the manufacturing and residential sectors.

We project Japan's LNG imports to increase slightly over the outlook period. We expect Australia in particular to increase its share, from around 21 per cent currently, to 40 per cent in 2020, mostly at the expense of ASEAN and Middle Eastern imports.

More broadly, we project a strong increase in non-OECD consumption over the medium term, with China as the main driver of this growth. Currently, parts of China are experiencing gas shortages in peak consumption periods. China's gas market will require substantial supplies and we expect it to grow as an export market for Australia's LNG exports.



Australia's LNG exports are projected to triple



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Australia's LNG exports are projected to triple:

Alternative Text: Australia's LNG exports are projected to increase significantly over the outlook period to 2019-20. Exports are projected to reach 76.6 million tonnes and earnings of roughly A\$46.7 billion (in 2014-15 dollars) in 2019-20.

Overall, we project that Australia's LNG exports will increase more than threefold, from 23 million tonnes last financial year, to around 75 million tonnes in 2019-20. By this time, Australia will be the world's largest LNG exporter.

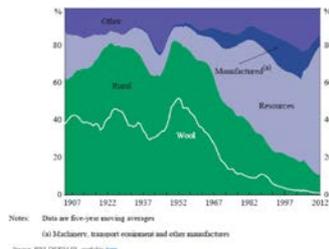
Conclusion and implications

There is no doubt that Australia's resources and energy sector will continue to be challenged over the short-term. Nevertheless, in the medium and long term we expect Australia to remain a key supplier of mineral and energy commodities to the emerging economies of Asia as well as to traditional key markets like Japan, South Korea and Taiwan.

Export volumes of LNG will be the principal driver of export revenue growth. Combined with a projected moderate rebound in commodity prices, at least in Australian dollar terms, this will underpin export revenues rising from around \$195 billion dollars last financial year to around \$260 billion in 2020. If realised, this will push resource and energy exports up to over 13 per cent of GDP.



Australia's export profile has changed markedly since Federation, with resources now dominant



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Alternative Text: Australia's export profile has changed markedly since Federation, with resources now dominant:

Australia's composition of exports has changed significantly from 1907-2012. Till the 1970's agricultural exports (including wool) accounted for the majority of total Australian exports, accounting for nearly 80 per cent of total exports in the mid 1950's. Since the 1970's exports from the resources sector have accounted for most of Australia's exports, roughly 65 percent in 2012.

It is worth putting this into a long-run and broader context. A century ago, our exports were dominated by rural commodities, principally wool. That began a steady decline, relative to other goods, following the end of the previous terms of trade peak in 1952, a result of wool shortages during the Korean War.

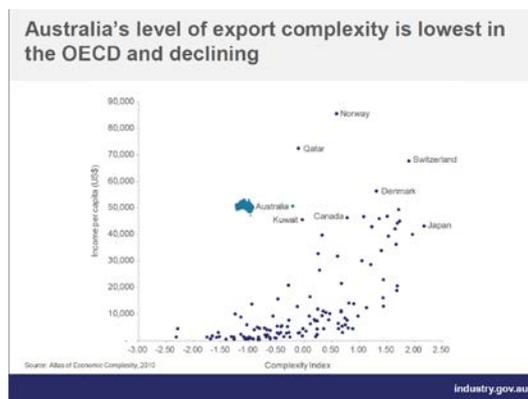
While our manufacturing industry was sheltered behind significant tariffs, it made only a modest contribution to exports. This began to increase markedly in the 1980s and 1990s as tariff barriers were unwound. A combination of intense import competition from low cost producers in developing countries like China and a high real exchange rate over much of the past decade has seen manufacturing exports stagnant in real terms, and therefore declining as a share of GDP.

The opening of the Australian economy in the 1980s and 1990s spurred a big rise in the overall contribution of exports to the economy, from around 15 per cent at the start of the reform period to over 20 per cent at the commencement of the millennium boom. Since then this share has remained stubbornly stuck, while Australia's overall share of global merchandise trade has declined to 1.3 per cent, well below Australia's share of global GDP.



Our export profile has become less diverse and less complex.

The International Monetary Fund calculates an index of export diversity, based on the number of goods produced within a country and the number of those exported. It shows that Australia's exports have become much less diverse since 2000 and we now have the fifth least diverse profile among OECD countries, with Norway, Iceland, Ireland and Chile behind us.



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Australia's level of economic complexity is relatively low and declining:

Alternative Text: While Australia has a diversified domestic industrial base, this is not reflected in the diversity of its exports. Australia with an income per capita of roughly US\$50 000 has an export complexity index of roughly -0.25. Australia's capacity to be internationally competitive in a range of diverse products has declined over the last fifteen years, despite a few emerging export industries, and we rank as one of the countries with the least diverse export profiles among the OECD.

Researchers at the Massachusetts Institute of Technology have recently derived a measure of export complexity, which takes into account both diversity and ubiquity – that is the number of goods traded and how many other countries are trading in the same good. On this measure, Australia's exports have become less complex since 2000, and we now have the lowest complexity score among all OECD countries.

This trend is a cause for some concern among policy makers. While rising commodity prices deliver windfall gains, downward commodity prices can erode national income. A sustained downturn in commodity prices – not what



we expect to be the case, but predicted by some commentators – would result in a significant income shock.

The government's Industry Innovation and Competitiveness Agenda released late last year identified five sectors in the economy with high global growth potential and where Australia was already well positioned to take advantage of this growth.

The five sectors are food and agribusiness, mining equipment, technology and services, oil, gas and energy resources, advanced manufacturing, and medical technologies and pharmaceuticals. Together, these five sectors account for nearly 40 per cent of business R&D expenditure and a quarter of export value.

This is not an exercise in picking winners. Governments in every advanced country make strategic choices about where to invest its science and research dollars, which export markets to nurture, and where it should focus its reform attention. It is better viewed as future proofing the economy to mitigate the risk of a hard crash on a steep cycle descent.

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Special thanks goes to John Barber and Gayathri Bragatheswaran for their assistance in preparing this presentation.

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Alternative Text: For further information please contact Mark Cully, Economic and Analytical Services Division. Phone: + 61 2 6243 7501. Special thanks also goes to John Barber and Gayathri Bragatheswaran for their assistance in preparing this presentation.



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