Trading Nation Consulting

Climate Policy and Australia's Resources Trade

Report Prepared for the Minerals Council of Australia

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Glossary

ABS	Australian Bureau of Statistics
Annex 1	Annex 1 Parties to the UNFCCC are principally developed countries and economies in transition
APEC	Asia-Pacific Economic Cooperation
BREE	Bureau of Resources and Energy Economics
BRIICS	Brazil, China, India, Indonesia, Russia, South Africa
CAIT	Climate Analysis Indicators Tool
CO_2-e	Carbon Dioxide equivalent
COP	Conference of the Parties
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DFAT	Department of Foreign Affairs and Trade
EU	European Union
FTA	Free Trade Agreement
G20	Group of 20: Argentina, Australia, Brazil, Canada, China, European Union, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom, and the United States
GDP	Gross Domestic Product
GNP	Gross National Product
GHG	Greenhouse Gas
GFC	Global Financial Crisis
IEA	International Energy Agency
HS	Harmonized Commodity Description and Coding System
LULUCF	Land use, land-use change and forestry
MCA	Minerals Council of Australia
Mt	Million tonnes
Non Annex 1	Non Annex 1 Parties to the UNFCCC are principally developing countries
OECD	Organisation for Economic Co-operation and Development
Ppm	Parts per million
RBA	Reserve Bank of Australia
UNCTAD	United Nations Conference on Trade and Development
UNFCCC	United Nations Framework Convention on Climate Change
WRI	World Resources Institute
WTO	World Trade Organization

Executive Summary

The Paris Conference of the Parties (COP) to be held over 30 November to 11 December 2015 is shaping up to be one of the most significant meetings on global climate policy for many years. There is now broad agreement that both developed and developing countries must make internationally-coordinated progress to address climate change. Although this understanding is still developing and lacks detail on the scope and mechanisms for greenhouse gas abatement, it is different from the position a few years ago when only developed economies were expected to meet binding targets.

Pressure is building for a substantial outcome from the Paris COP.

Internationally, pressure is building for a practical outcome. There are a number of reasons for this. The United States is becoming more active in promoting a result, while China now sees political and economic advantages in being more engaged. These changes were reflected in the US-China agreement on climate change announced at the 2014 APEC Leaders' Meeting. The European Union and Japan support a substantive outcome. There also is growing interest around the world in climate mitigation. What all of this means is difficult to predict at this stage, but over the next few months countries will start to make judgements about reduction targets beyond 2020 and the scope for improving them.

This could have a profound impact on the Australian economy and the minerals sector.

Depending on its scope and stringency, a substantive outcome in Paris could profoundly affect the Australian resources sector, which is a major contributor to Australian emissions as currently measured. This in turn could have important implications for the Australian economy. The minerals industry produces around 12 per cent of Australia's emissions, accounts for almost nine per cent of the value added by all industries in Australia, and around 18 per cent when linkages to other sectors are taken into account. It also accounts for close to 60 per cent of exports of all goods and services, paid some $22 billion in company tax and royalties in 2013-14 and provides one in ten jobs when linkages to other sectors are included.

Australia's economic structure is different from other OECD economies.

Australia's dependence on resources at an early stage of processing, as well as its rapid population and per capita income growth, means that its economic structure and outlook are different from other developed economies. Among OECD economies, only Norway has greater dependence on exports of minerals and fuels. The minerals industry also faces intense competition from other suppliers, in a context where capital, skilled labour and technology are internationally mobile. Unlike many other OECD countries, Australia's competitors are often emerging or developing economies. In the case of iron ore, for example, the industry faces competition from Brazil and from domestic suppliers in China for a share of that very large market. For thermal coal, Indonesia is a strong competitor. The number of emerging and developing economies supplying significant quantities of resources is increasing. From an Australian perspective, this underscores the need for key emerging economies to make contributions to

any global solution on climate change.

Australia is a net exporter of emissions.

Australia also differs from most OECD economies in that available evidence indicates that it is a net exporter of emissions, with production of emissions exceeding consumption. The European Union, the United States and Japan are among prominent importers. In effect, net importers outsource emissions embedded in their economic activity to countries that export emissions, raising questions about the fairness of approaches which measure emissions on a production basis. China, which exports embedded emissions in its manufactured exports, is the world's largest net exporter of emissions.

Australia can do little by itself to influence global climate change.

By itself, Australia can do little to influence global climate change. Australia's emissions constitute a small and declining share of global emissions. In 2011, Australian emissions (including land use and forestry) were about 1.3 per cent of the estimated global total. On current projections, Australia's emissions will shrink to around one per cent of the total by 2050. Annual increases in global CO_2 emissions since 2000 have averaged around twice the level of Australia's emissions.

Australia has performed better than most other developed economies in constraining emissions growth since 1990. Its modest increase in total emissions of 2.4 per cent from 1990 to 2012 compares favourably with Canada (+42 per cent), Japan (+8.6 per cent) and the United States (+2.7 per cent). In addition, the emissions intensity relative to GDP of Australia's economy has fallen at a faster rate than for most developed economies. Taking into account emissions embodied in trade casts a still more positive light on Australia's emissions performance. If full account were to be made of the emissions embodied in trade by reporting consumption rather than production of emissions, the gap between Australia's levels of reported emissions relative to the European Union, the United States and Japan would narrow markedly.

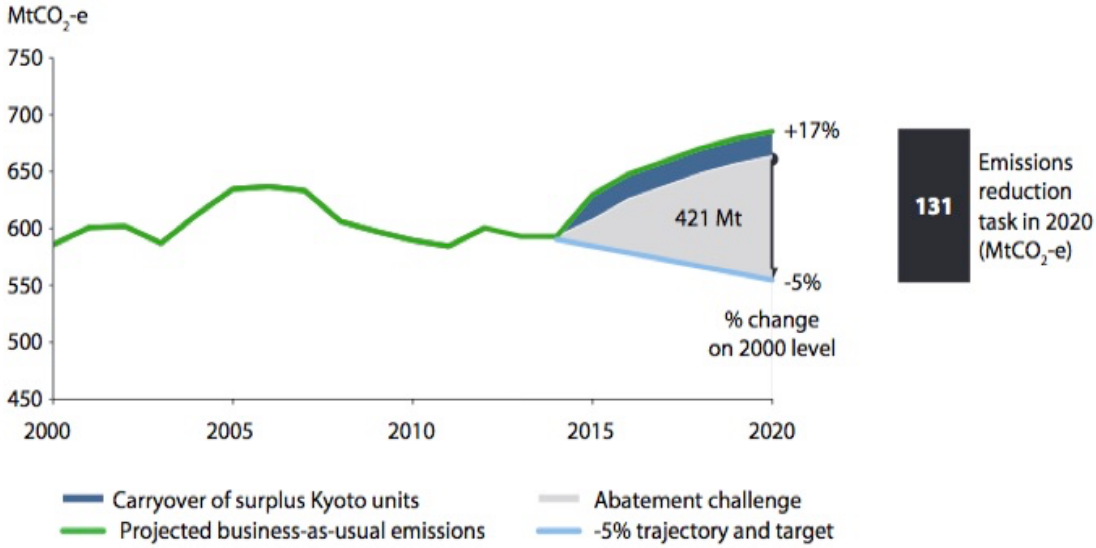
Australia's current 5% target is comparable with US and EU targets

The Australian Government is currently committed unconditionally to cutting emissions by five per cent from 2000 levels by 2020. Other targets announced include a 17 per cent reduction from 2005 levels for the United States, a 20 per cent reduction from 1990 levels for the European Union (30 per cent if there is a comprehensive international climate change agreement) and a 3.8 per cent reduction from 2005 levels for Japan. At first glance, Australia's target seems modest by comparison with some other advanced economies, but it is comparable measured against a common base year. From 2005, which is quite widely used to specify commitments, Australia's commitments represent a 13 per cent reduction. This is a bigger cut than the unconditional target for the European Union and for Japan. It compares favourably with the 17 per cent target of the United States. Australia's commitment is also comparable when targets are measured as a reduction from levels under a 'business as usual' scenario. Australia's 2020 target represents a cut of over 20 per cent on this basis (see Chart). It is substantially bigger than those for the European Union and Japan (which have slower projected population and per capita income growth) and is close to that of the United States.

Modelling suggests that Australia would be the most adversely affected of major economies.

Economic modelling suggests that Australia would be among the most adversely affected of major economies from policies intended to achieve current national targets. One such modelling exercise, using the G-Cubed model, shows losses in terms of 2020 GDP of over 6 per cent for Australia compared to business as usual – the highest among countries and regions modelled and substantially greater than losses for China, Europe and the United States.

Australia's Abatement Task to 2020



Source: Australian Government, *Emissions Reduction White Paper*, April 2014

Reform will help adjustment to lower levels of emissions.

Australia needs continuing economic reform if it is to boost growth in a challenging global and domestic environment. Over the past decade, productivity performance has been lacklustre. Among other things, reform will need to include creating more flexible labour and product markets, more emphasis on fiscal sustainability and a commitment to bringing taxation regimes into the 21st century. Reforms of these kinds will help Australia's economic adjustment in seeking to achieve its emissions targets. It will, of course, also be essential that these targets be appropriate for Australia's emissions profile.

Climate policy must support open trade policies.

Internationally, Australia's approach to climate policy in the lead-up to the Paris COP will need to be guided by three core considerations. First, Australia's approach must be credible in the sense that its proposals must support an internationally co-ordinated approach to addressing rising emissions and the effects of climate change. Second, it must provide for a measured transition to a low-emissions global economy that minimises adverse social and economic effects. And third, it must prevent climate policy coming into conflict with trade policy, most importantly by ensuring that the gains which have been made in building a more open world economy are not undermined by green protectionism.

A feeble outcome at the COP would increase the prospect of a generalizable outbreak of protectionism.

Australia's unique position needs to be recognised in the Paris negotiations.

Australia will need to continue to press that its unique position among developed economies be recognised in any agreements or understandings which emerge from Paris. To maintain broad community support, Australia's contribution should be no higher than the costs borne by other advanced countries and by Australia's key trading partners. Modelling and other supporting analysis which takes into account the key drivers of emissions – including different economic structures, population growth and per capita income growth – would be useful in informing the Australian Government's approach to negotiations.

A strong resources sector is needed to deliver growth and jobs.

Australia needs a strong resources sector if it is to continue to deliver jobs, robust economic growth and rising living standards. A strong resources sector is also required if Australia is to continue to play a part in providing the minerals, energy and the advanced mining services which developing economies (especially in Asia) require to lift tens of millions of people out of poverty. The world and Australia will gain nothing if approaches to climate change are developed which place unnecessary penalties on industries which are at world best practice and in which Australia's has a clear comparative advantage.

Climate Policy and Australia's Resources Trade

1. Introduction

2015 is shaping up as a big year in international climate policy development. Political momentum behind international climate change policies and negotiations is starting to recover after the failure of the Copenhagen Conference of the Parties (COP) in November 2009 and the distractions of the Global Financial Crisis. Most importantly, there is increasing international momentum to agree on moderately ambitious (though still vague) commitments to reduce greenhouse gas emissions beyond 2020 at the Paris COP (30 November-11 December 2015). The Australian government is committed to reviewing its targets and settings in the context of the lead-up to the Paris conference. The review "will take into consideration action taken by the major economies and our major trading partners" (Abbott & Bishop 2014).

This has potentially major implications for Australia depending on the scale, timing and country coverage of new abatement commitments. The resource and emissions intensity of our economy and trade, our relatively fast trend rate of economic growth and our rapid population growth make Australia distinctive among advanced economies. This distinctiveness needs to be taken fully into consideration by Australia's policy makers in considering the review of Australia's emissions targets for two reasons. Policy choices on climate have profound economic and social implications. And the emissions-intensive minerals sector is a major and essential contributor to national income, investment, high-wage jobs, exports, and government revenue in Australia.

Australia's minerals industry operates in fiercely competitive commodity markets. The contest for investment and skill also is global: capital, skilled labour and technology are highly mobile and move between resource rich countries. In taking on new domestic and international emissions commitments, it is critical that new layers of cost added to the economy through additional abatement commitments are roughly in line with the costs borne by comparable countries, including our competitors in global markets. Not to do this would damage major trade-exposed, emissions-intensive industries like minerals and energy that account for the great bulk of Australia's total exports. It also would have negative implications for the wider economy as well as for Commonwealth and State Government revenues.

Australia needs a strong competitive resources sector far into the future if we are to continue to enjoy robust economic growth and rising living standards. And Australia needs a strong competitive resources sector if it is to continue to play its full part in providing the raw materials, energy and advanced services that help to underpin regional and broader economic and social transformations that contribute to lifting tens of millions of people out of poverty. These facts put the onus on Australian governments of all shades to develop policies – economic, environment and trade – that contribute to high and rising levels of productivity, deliver more assured access to international markets, and deepen relationships. Climate policies, as part of this policy suite, must complement Australia's core strengths, including by not compromising trade policy objectives. Australia gains nothing in terms of jobs and higher living standards, and the world gains nothing in terms of either climate mitigation or well-functioning and secure resources and energy markets, if unnecessary regulatory hurdles (and therefore costs) are imposed on Australia's most efficient industries.

Australia has a core national interest in contributing to internationally-coordinated mitigation of climate change. But to maintain broad community support, Australia's contribution to mitigation efforts must be fair: the economic costs of abatement borne by Australia should be no higher than the costs borne by other advanced countries and our competitors in global markets. In a practical sense that means joining in international efforts that are responsive to countries' unique circumstances – their different economic and trade structures, geographies, demography, growth prospects and so on.

The principle that advanced countries should make broadly comparable economic efforts in implementing mitigation commitments, taking into account their national circumstances, has guided Australia's approach to negotiations on climate change since the mid-1990s. It is important that it continues to frame Australia's negotiating posture in the lead-up to the Paris COP and beyond.

This paper has been written to inform the policy debate about Australia's climate change commitments by presenting key facts and figures on Australia's minerals sector and its performance across a range of metrics compared with other developed and developing countries. Part 2 reviews Australia's resource exports, their contribution to output and exports and compares this with other OECD economies. Part 3 moves the discussion to the inter-relationships between the minerals sector and climate policies. It compares Australia's current and projected emissions with those of other developed countries, examines Australia's minerals trade and projected global demand for resources and energy, and then considers Australia's adjustment task in meeting future emissions targets compared to other OECD economies. Part 4 starts with an overview of international and domestic pressures in the lead-up to the Paris COP and considers briefly how those pressures may evolve over the next few years. This provides the context in Part 5 for considering domestic and international options that may be available to Australia in approaching upcoming negotiations. This is considered particularly from the perspective of what is required to enable resources and energy companies to perform more effectively on international markets. Concluding comments highlight how business can contribute to a constructive outcome at the Paris COP.

2. Australia's Resources Exports

2.1 Contribution of the Mining Industry to Output and Exports

The Australian resources sector has expanded substantially over the past decade. Since 2003-04, value added by mining has more than doubled, from 4.4 per cent to 8.9 per cent of the value added by all industries.[1] The value-added by mining is appreciably larger than that of manufacturing industry and several times that added by agriculture. However, the contribution of mining varies markedly by state and territory. In Western Australia, factor income for the mining sector accounted for almost 32 per cent of the factor income of all industries in 2013-14, up from about 19 per cent in 2003-04. In the Northern Territory, the (much smaller) mining industry accounted for about 17 per cent of total factor income and in Queensland for just under ten per cent (Figure 1).[2]

[1] In line with the growing value added by mining, the sector's contribution to Australia Government revenues

[2] The figures in this paragraph are for value added and factor incomes in nominal terms. The contributions of minerals could therefore fall back if the recent decline in commodity prices is sustained.

Figure 1

Mining: Share of Factor Income of All Industries

Source: ABS Cat. 5220.0 2013-14

These figures cover only the mining industry directly measured. When the resource economy is defined more broadly to include basic metal manufactures, industries which provide inputs to mining and resource extraction, as well as investment to support future production, the sector is significantly larger – at approximately 18 per cent of the value added by all industries in 2011-12. Sectors with substantial resource-related activity include construction, manufacturing, transport, wholesale trade, business services and electricity, gas, water and waste services. Employment in the so called 'resource economy' is also much bigger than ordinarily thought – at almost 10 per cent of total employment, with around two thirds of this in industries supplying inputs to resource extraction (Rayner and Bishop 2013; Bishop et. al. 2013). In Western Australia, for example, mining has helped to underpin rapid growth in the manufacturing sector, which now accounts for a quarter of Australia's manufactures exports (Chamber of Commerce and Industry of Western Australia 2015, p.28). Even where their contribution to overall economic activity is modest, resources can still play a key role. In New South Wales for example, coal is by far the largest merchandise export (DFAT 2014, p.18; Tasker 2015).

Australia's exports of resources[3] were around $191 billion in 2013-14, or almost 70 per cent of all exports of goods and close to 60 per cent of exports of all goods and services (Table 1). In volume terms, resources exports have grown at 5.2 per cent per annum since 2003-04, appreciably faster than total exports of goods and services. Metal ores and minerals have grown particularly rapidly, at almost double the rate of total goods and services exports (Table 2). This principally reflects rapid growth in iron ore exports over this period as the big mining companies in Western Australia have ramped up production. Coal exports have also

[3] Resources as defined here include basic metal manufactures (including non-monetary gold), as well as mineral ores and mineral fuels (see Table 1). The usage is consistent with that used by the Department of Foreign Affairs and Trade (see Bingham 2012).

grown very rapidly. In volume terms, 'other mineral fuels' and metals grew much more slowly, while exports of non-monetary gold declined.

Table 1

Australian Resources Exports by Value

A$ million, except where otherwise indicated

	2003-04	2008-09	2013-14
Metal Ores and Minerals	14,885	52,049	96,552
Coke, Coal and Briquettes	11,000	54,954	40,153
Other Mineral Fuels	8,778	20,706	29,190
Metals (excluding non-monetary gold)	7,753	12,394	11,142
Non-monetary Gold	7,031	17,508	14,118
All Resources	49,447	157,611	191,155
All Goods	109,418	231,615	273,803
Total Exports (including services)	146,540	283,461	331,184
All Resources as a Share of All Goods, %	45.2	68.0	69.8
Resources as a Share of Total Exports, %	33.7	55.6	57.7

Source: ABS Cat. 5302.0, September 2014

Table 2

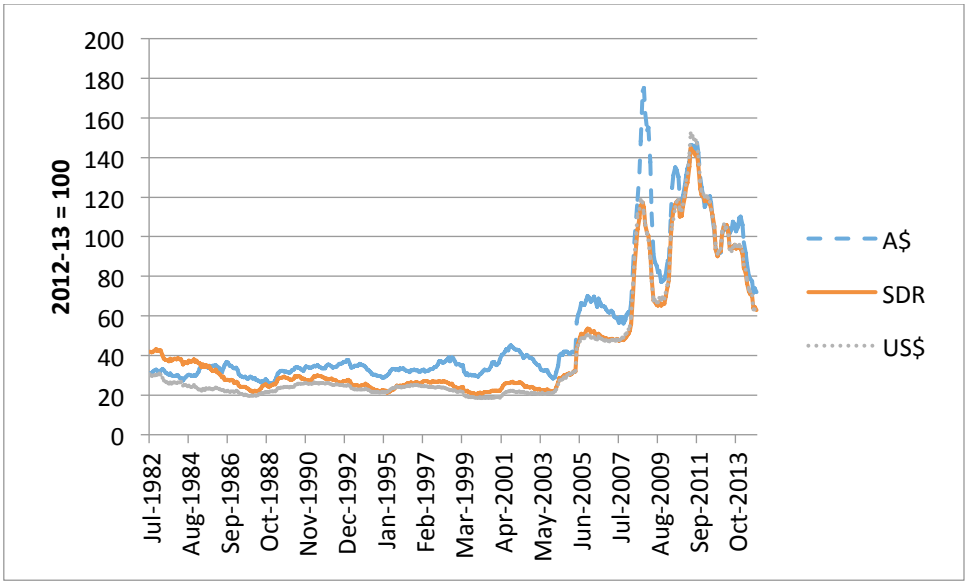
Australian Exports of Minerals by Volume

	2003-04	2008-09	2013-14	10 Year AAG, %
Metal Ores and Minerals	100.0	120.6	205.5	7.5
Coke, Coal and Briquettes	100.0	126.1	188.5	6.5
Other Mineral Fuels	100.0	119.9	129.3	2.6
Metals (excluding non-monetary gold)	100.0	109.3	118.8	1.7
Non-monetary Gold	100.0	118.8	79.5	-2.3
All Resources	100.0	119.5	165.8	5.2
All Goods	100.0	114.5	150.0	4.1
Goods and Services	100.0	116.0	145.0	3.8

Source: ABS Cat. 5302, September 2014. Indices are derived from chain volume measures published by the ABS with a reference year of 2012-13 rebased to 2003-04. AAG refers to the average annual growth rate and is calculated here as a compound growth rate.

Figure 2

Indices of Australian Bulk Commodity Prices



Source: Reserve Bank of Australia. Bulk commodities are iron ore, metallurgical coal and thermal coal. The indices are based on export earnings, which may differ from spot price indices.

Australia is one of the great exporters of resources and a primary source of resources and energy for East Asia and beyond, but it operates in highly competitive global markets with strong competing sources of supply (see Section 3.2). These markets are also very cyclical and are characterised by substantial and sharp price movements. For all mining, energy and metal resources, prices (as measured by the Reserve Bank's Australian dollar price index) fell by around 46 per cent between their peak in October 2008 and October 2009, before rising again. They then fell again by some 36 per cent between September 2011 and December 2014. Figure 2 shows the movements in bulk commodity prices (iron ore, metallurgical coal and thermal coal) since the early 1980s, again highlighting the sharp movements in prices. Importantly, resources exporters' costs, and hence their international competitiveness, are determined largely in domestic markets. This underlines the importance of business and government initiatives to keep domestic costs down (see Section 3.2).

2.2. Comparison with other OECD Economies

Australia's dependence on resources exports at an early stage of processing underlines the difference between our economy and other advanced economies. Figure 3 below, based on OECD data, shows that minerals[4] together accounted for more than 57 per cent of Australia's merchandise exports, compared with the OECD average of around 11 per cent. Only Norway, with its substantial exports of petroleum, had a higher export dependence on minerals and fuels. Canada is a significant exporter of crude oil, liquefied petroleum gases, and coal but is much less dependent on them than Australia. Chile, with its vast exports of copper and copper ore, is another significant supplier of resources.[5] Most other advanced economies have

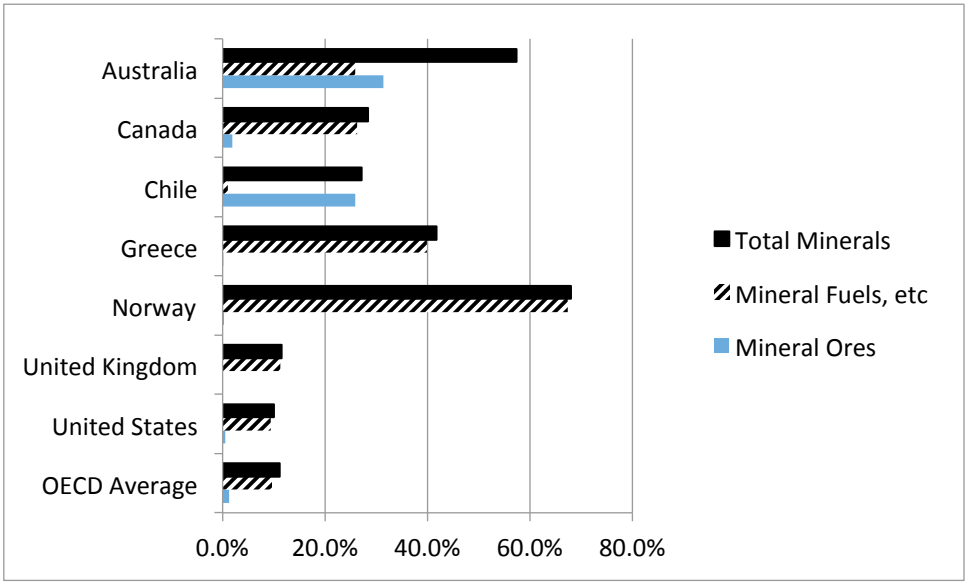
[4] Minerals here cover only Chapters 25, 26 and 27 of the Harmonized System. They therefore leave out some products, especially metals and non-monetary gold, which fall within the broader definition of resources used earlier in this paper.

[5] Greece makes an appearance in Figure 3 mainly because of its role as a petroleum refiner: its domestic production of oil and natural gas is very small.

post-industrial economies and trade structures, with trade in minerals a small proportion of their merchandise exports.

Figure 3

OECD: Share of Minerals and Fuels in Merchandise Exports, 2013



Source: Derived from OECD data. The OECD average is a weighted average. Total minerals includes HS25, which is not shown separately in the graph because its share of country exports is very small.

3. Australia's Current and Projected Emissions

3.1 Comparison with other Countries

Three key points can be made about Australia's emissions profile and performance over recent decades. First, Australia's emissions constitute a small (and falling) share of global emissions. In 2011, Australia's emissions (including land use and forestry) were about 1.3 per cent of the estimated global total, compared with 1.5 per cent ten years earlier (WRI 2014). Australia's share of emissions is set to shrink to around one per cent by 2050 as emerging large economies, especially China and India, account for a larger share of emissions[6] whether or not business as usual or climate mitigation scenarios prevail (Australian Government 2008, Ch.3).[7] Annual increases in global CO_2 emissions since 2000 have averaged around twice the level of Australia's emissions.[8] This underlines the fact that Australia, by itself, can do little

[6] Much the same (and updated) results were obtained by CSIRO using the Representative Concentration Pathways (RCP) 8.5 scenario (high emissions, business as usual). The data are used in a forthcoming paper on applied energy. CSIRO modelling shows Australia accounting for 0.9 per cent of world emissions in 2050 and 1.1 per cent of total emissions over the period 2011-50. For information on the RCP 8.5 scenario, see Riahi (2011).

[7] The World Resources Institute CAIT 2.0 database shows the share of the BRIICS (Brazil, Russia, India, Indonesia, China and South Africa) of total world emissions rising from 31 per cent in 1990 to 33 per cent in 2000 to 41 per cent in 2011.

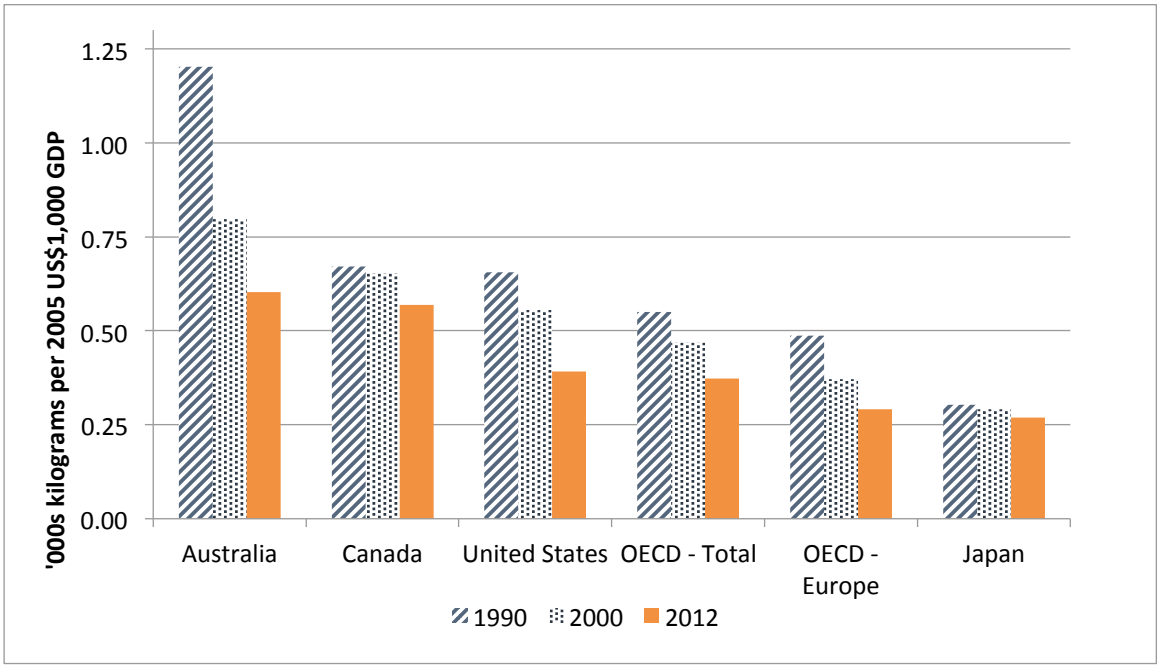
[8] See for instance the Global Carbon Project (2014) which shows global increases in fossil fuel and cement CO_2 emissions of 2.3 per cent in 2013 and average increases of 3.3 per cent per year from 2000 to 2009.

to affect global emissions in aggregate and therefore human-induced climate change. This is not an argument for inaction, but it is important to consider in the context of Australia's mitigation efforts.

Second, Australia has performed as well as, or better than, most developed nations in constraining emissions growth since 1990 (see Box 1). Allowing for changes in land-use and forestry, total emissions grew by 2.4 per cent from 1990 to 2012, which compares favourably with Canada (+42 per cent), Japan (+8.6 per cent) and the United States (+2.7 per cent), though not with the production of emissions by the European Union (-21.0 per cent) (UNFCCC 2014). Australia's emissions intensity relative to GDP also fell at a faster rate than most developed economies. Total emissions to GDP halved between 1990 and 2012 compared to falls over the same period of around 40 per cent in Europe and the United States, 15 per cent in Canada and just over 10 per cent in Japan (Figure 4).

Figure 4

OECD: Greenhouse Gas Emissions per unit of GDP



Source: Derived from OECD data. GHG emissions include LULUCF.[9]

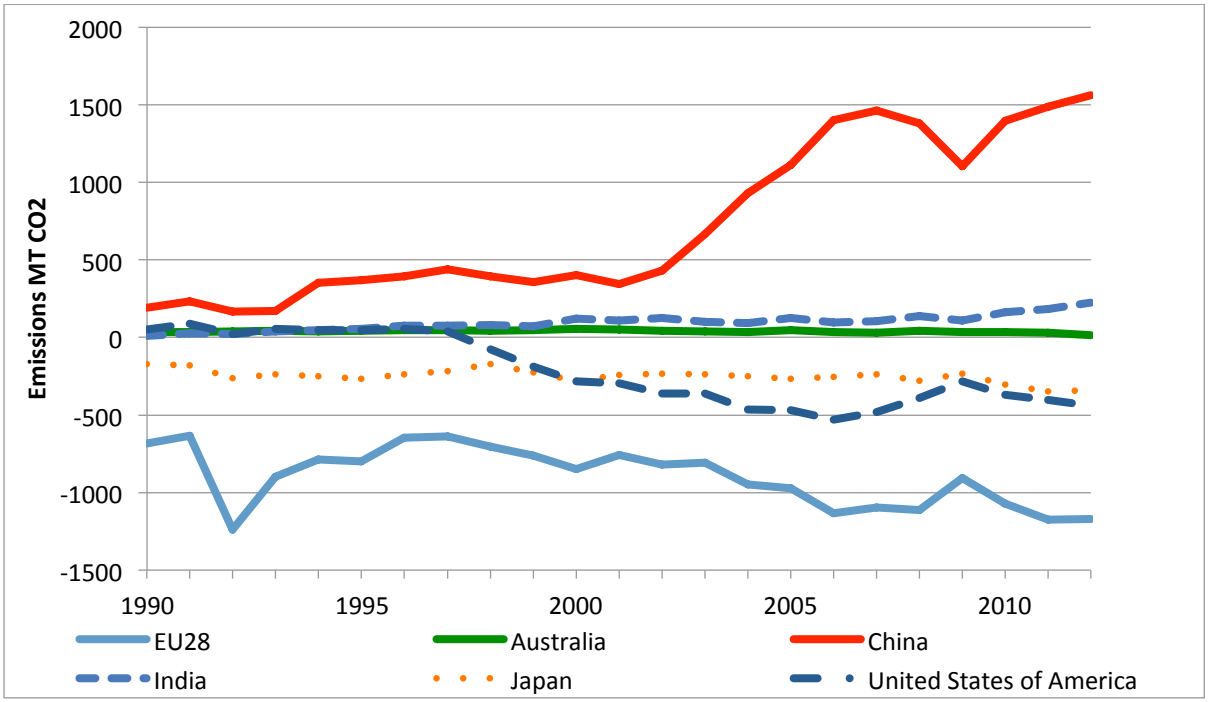
Third, Australia's emissions profile and performance reflect our distinctive economic structure and export profile, which in turn underpin national prosperity. In 2010-11, Mining accounted directly for around 12 per cent of total emissions and agriculture 18 per cent (ABS 2014). Australia, like other trading nations, has to harness its advantages relative to other nations to promote economic growth, generate jobs and improve living standards. In Australia's case, part of doing well depends on extracting and exporting resources that other countries need to develop and enhance their infrastructure. This in turn means that Australia's

[9] Total OECD emissions exclude LULUCF for Chile and Israel (not available). Mexico LULUCF for 2012 is assumed to be the same as 2010 (latest available data).

emissions intensity is higher than other advanced economies that tend to specialise more in less emissions-intensive services.

By exporting relatively emissions intensive resources, Australia is, in effect, producing emissions on behalf of the importers of those goods and others further along the supply chain. The weight of available evidence suggests that emissions embodied in Australia's exports exceed those embodied in our imports. The European Union, the United States and Japan, on the other hand, are major net importers (Box 1; Attachment A), meaning that they effectively outsource a significant part of emissions production embedded in their economic activity. For example, average annual EU net imports of emissions since 2005 averaged over 1,000Mt CO_2 or nearly twice the level of Australia's total emissions (Figure 5).

Figure 5
Net Transfers of Emissions via International Trade



Source: Peters et al (2011), updated. Data are from http://emissions2014.globalcarbonatlas.org/exportGraphic. Data for 2011 and 2012 are preliminary.

International forums like the UNFCCC assess countries' emissions performances on the basis of emissions produced and not on what they consume, thereby favouring net importers of emissions. If, however, full account were to be made of emissions embodied in trade by reporting consumption rather than production of emissions, the gaps between Australia's levels of reported emissions relative to the European Union, the United States and Japan would narrow markedly. In 2012, for instance, the differences between the levels of emissions per 2005 US$ GDP of Australia and the European Union and Japan would have

narrowed by around 25 to 30 per cent. And the gap between Australia and the United States would have narrowed by around 20 per cent.[10]

Box 1

Metrics for Greenhouse Gas Emissions

A number of measures are used in public discussions on climate change to assess the contributions of Australia and other countries to greenhouse gas abatement. If the production of greenhouse gases is the focus of attention, metrics include:

- total greenhouse gas emissions;
- per capita emissions;
- emissions per unit of GDP;
- targets for reducing emissions; and
- projected reductions in emissions compared with 'business as usual'.

Australia inevitably scores better on some of these metrics than others. Aggregate emissions are around 1.3 per cent of global emissions. Australia's increase in total emissions since 1990 compares favourably with advanced countries as a whole: the increase in aggregate OECD emissions since 1990 is around 5 per cent, though European countries have reduced their emissions substantially (see main text).

Australia's per capita emissions are high compared with most other OECD countries. Per capita emissions is a simple and straightforward measure and is used widely as a benchmark. However, it does not capture the links between economic structure (the goods and services produced by an economy) and the production of emissions. Typically, advanced economies have higher per capita emissions than developing economies and resource-intensive developed countries such as Australia have higher per capita emissions than developed countries with post-industrial economic structures. If it is to be used in assessing countries' performance, the focus should be on changes in the level of per capita emissions, rather than the levels themselves.

Emissions intensity is measured relative to economic activity using emissions per unit of GDP. These measures take into account the structure of the economy and are useful for measuring emissions performance relative to economic growth. Results can differ with the choice of GDP measure. For comparisons across time, a common price unit for a specific year needs to be used. (International agencies including the OECD currently use US$ in 2005 prices and exchange rates.) Australia's emissions per unit of GDP are also high compared with other OECD countries, but have fallen by more than the OECD average since 1990 (Figure 4).

Emissions targets are generally benchmarked against a base year. Australia's 5 per cent unconditional reduction target by 2020 relative to 2000 seems small, but is comparable to

[10] Authors' estimates, drawn from the Global Carbon Project, using Peters et al (2011), updated; GDP data from the UN Statistics Division (United Nations 2013); and OECD data. Data for 2012 are preliminary. The Global Carbon Project data include only emissions of CO_2 from burning fossil fuels and manufacturing cement (see Attachment A). The estimates reflect how UNFCCC of total GHG emissions including LULUCF would fall if emissions per unit of GDP were based on where they are consumes rather that where they are produced. Note also that these estimates can be affected by the choice of unit used for GDP (see Box 1).

the targets set by other OECD economies measured against a common baseline or projected reductions from 'business as usual'. Comparing projected emissions reductions by 2020 with 2005, Australia's reduction task is broadly similar to that of the United States and Canada. It exceeds Japan's target reduction under current policy. It also exceeds EU abatement under its minimum emissions reduction targets for 2020 but falls well short of potential abatement under the European Union's conditional maximum targets. Similarly, Australia's 5 per cent reduction target for 2020 against business as usual emission levels – reflecting the effects of faster population and economic growth compared to many OECD economies and a more energy intensive economic structure - compares reasonably well with abatement efforts by the United States, Canada and the EU27 (in terms of its minimum commitments). It also is far superior to Japan's abatement efforts against business as usual.

More complex metrics have been developed in a recent study by Deloitte Access Economics (2014) which seeks to compare Australia with other G20 economies. Three econometric models are used. One is a fixed effects model, with the estimates providing a measure of CO_2 emissions once allowance is made for the structure of the economy and other relevant variables. The other two econometric models are stochastic frontier models. One explains GDP per unit of CO_2 emissions with proximity to the 'frontier' indicating a high degree of environmental efficiency in the production of goods and services. The third model aims to estimate the efficiency with which GDP is produced and uses the result to calculate how much wasteful CO_2 is produced. When the results from the three models are averaged, Australia ranks 10th or 11th in the G20, depending on whether use of fossil fuels is included as an explanatory variable. The broad conclusion is that Australia emerges with a respectable ranking if allowance is made for the structure of its economy and other variables.

Yet another approach is to measure the consumption of greenhouse gas emissions: that is, emissions embodied in countries' expenditure on goods and services. The same measures listed above (for example, total consumption of emissions and per capita emissions consumption) can be used to compare countries and to identify whether countries are net exporters or importers of emissions. A country is a net exporter if it produces more emissions than it consumes. Major net exporters of emissions include China, Russia, India and South Africa. Prominent net importers include EU countries, the United States and Japan (Davis & Caldeira 2010). The weight of evidence to date is that Australia is a net exporter (see Attachment A). Using measures of consumption of greenhouse emissions improves Australia's emissions profile relative to other advanced economies, which are mostly net importers of emissions.

Proponents of consumption-based measures argue that this is a more equitable basis for targeting emissions and that the approach allows countries to target emissions without the adverse effects on competitiveness which can result from production-based measures. It therefore improves the prospects for comprehensive global action on climate change (Carmody 2009). [11]

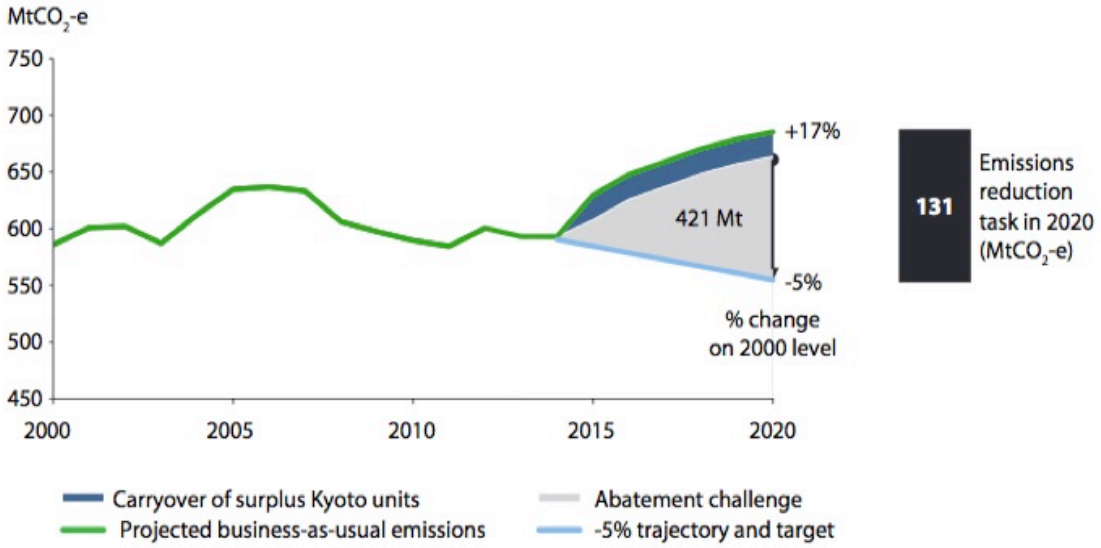
[11] Extensive data and charts focusing on the production and consumption of CO_2 emissions from the combustion of coal, oil, gas, the process of gas flaring and the manufacture of cement are available from the Global Carbon Project (www.globalcarbonproject.org).

3.2 Australia's Adjustment Task and Issues for International Competitiveness

The Australian Government is committed to cut Australia's emissions to 5 per cent below 2000 levels by 2020. Total emissions rose slightly between 2000 and 2012 – rising in the years before the Global Financial Crisis (GFC) and then subsequently falling. Recent data indicate further falls since 2012. Total emissions are projected to resume their upward path from 2015 to be 17 per cent above 2000 levels by 2020 in the absence of policy interventions.[12] This implies Australia is committed to bringing emissions down by around 131 $MtCO_2$-e per annum by 2020, to over 20 per cent below the projected 'business as usual' emissions (Figure 6).[13] The Direct Action Plan, whose centrepiece involves the Government purchasing emissions reduction commitments from businesses and the community by 'reverse auctions', is being put in place to address this commitment.

Figure 6

Australia's Abatement Task to 2020



Source: Australian Government, *Emissions Reduction White Paper*, April 2014

Government projections also show business as usual emissions rising a further 17 per cent from 2020 to 2030, with electricity generation accounting for over one third of these increases and fugitives for one sixth (Department of the Environment 2013).[14] Targets beyond 2020 have not been endorsed by the current Australian Government. The Climate Change Authority's view (2014a) is that further action will be required beyond 2020, with a

[12] Fugitive emissions associated with the production of liquefied natural gas (LNG) for export account for nearly 40 per cent of the projected increase.

[13] The emissions reduction task could well be revised down. The Climate Change Authority has recently indicated that the next official (business as usual) projections are expected to be lower, citing 'the effects of structural changes in the Australian economy, behavioral change and the impacts of past policies, including energy efficiency' (Climate Change Authority 2014b, p 22). See also Frontier Economics (2014).

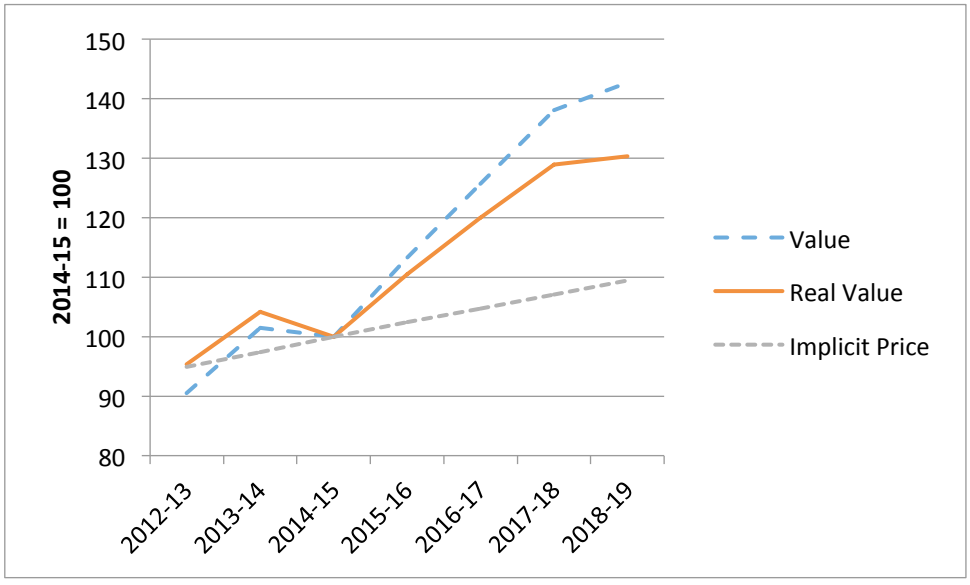
[14] The business as usual projections to 2020 and the projections to 2030 take into account the Renewables Energy Target (RET) that was legislated at the time the projections were prepared, and exclude any impacts on emissions from the Direct Action Plan.

range of between 40 and 60 per cent reduction of greenhouse gas emissions from 2000 levels by 2030. This would build on its recommendation for a minimum target of 15 per cent below 2000 levels by 2020. If it were to be adopted, this would have very significant implications for the resources sector and for the Australian economy. Abatement post-2020 will be a focus of the Paris COP, which is discussed in detail in Section 4 below.

Australia's resources endowments and its continuing reliance on them for exports into the foreseeable future underline the importance of ensuring that mitigation and abatement policies do not compromise the competitiveness of Australia's resource base. Under current policy settings, Australia's strong resources export story is expected to continue well beyond the mining boom. The projected growth in resources trade is illustrated in Figure 7, which shows export volumes, prices and export values derived from forecasts in September 2014 by the former Bureau of Resources and Energy Economics (BREE). The projections show the value of resource and energy exports up over 40 per cent on 2014-15 levels by 2018-19. This is expected to be driven mainly by increases in the volumes of these exports, but also reflects a modest recovery in prices. The growth in the nominal value of resource and energy exports amounts to more than nine per cent per annum. Growth in the value of resources and energy is driven partly by extremely rapid growth in LNG exports, with their value increasing by almost 33 per cent per annum from 2014-15 levels. Free trade agreements with Korea and Japan (which have now entered into force) and China (recently concluded) will add impetus to the growth in resources exports.

Figure 7

BREE Medium-Term Forecasts/Projections of Resource and Energy Exports



Source: Derived from data in BREE (2014a, p.18)

Medium-term projections of this kind are, of course, subject to considerable uncertainty, and the longer-term outlook is subject to much greater uncertainty both in relation to changes in domestic cost competitiveness and global market conditions. But there is a sense that, under

current policy settings, the Australian resources and energy sector is likely to continue to have a larger share of output than before the minerals boom,[15] minerals exports should grow strongly in volume terms possibly into the early 2020s (BREE 2014b, Chapter 5) before entering a period of slower growth, and their share of Australia's total exports should remain significantly above pre-boom levels (Box 2).

On this latter point, research by Treasury officials as part of the background work for the 2013-14 Mid-Year Economic and Fiscal Outlook suggests that the share of resources (in their terminology, 'non-rural commodities') in Australia's total exports is likely to increase in volume terms until 2017-18, primarily because LNG exports are projected to expand very rapidly (Bullen, Kouparitsas and Krolikowski 2014, p.28). Thereafter they expect the share of resources to remain roughly constant over the outlook period for their research (which extends to 2029-30). The share of resources in nominal terms is particularly difficult to forecast given that it depends on prices which are highly uncertain. But in both volume and nominal terms, the share of resources will be sensitive to greenhouse gas policies, including what these policies are, what they cost and whether or not they are in line with those adopted by Australia's competitors.

Box 2: Long-term Outlook for Australia's Minerals and Energy Exports

In 2012, BREE undertook work to forecast exports out to 2025 in order to determine Australia's infrastructure requirements as the minerals boom moved to the production and export phase.[16] BREE projected iron ore exports to be between 885 and 1082 million tonnes by 2025 (exports were 652 million tonnes in 2013-14). Coking coal exports were expected to be between 260 and 306 million tonnes (compared with the 2013-14 figure of 180 million tonnes), while steaming coal exports were expected to lie between 267 and 383 million tonnes (compared to 195 million tonnes in 2013-14).

While difficult to quantify, there are a number of factors that suggest that Australian resources and energy exports are likely to experience solid growth over the next decade. China's growth rate has slipped, but its development still has a long way to run, and growth is likely to remain rapid by the standards of many other emerging economies. It is not expected to reach the same level of per capita steel consumption as Korea, but China's demand for iron ore and metallurgical coal will still continue to grow, if at a much slower pace than previously as it moves towards an economy based more on consumption and services. Other emerging economies in the region, such as India and Indonesia, are also likely to grow quite rapidly and their consumption of minerals and energy will continue to increase.

Demand for coal and other fossil fuels will be affected by greenhouse gas mitigation policies. The central projection by the International Energy Agency (IEA) shows coal demand continuing to rise in both the medium term (to 2020) and long term (to 2040), albeit at a slower pace than in the past. Under this scenario, which involves some new

[15] See Minerals Council of Australia et. al. 2013, pp.15-16.

[16] As at February 2015, these long-term forecasts had not been updated, either by the former BREE or by the Office of the Chief Economist in the Department of Industry and Science, which is now responsible for publishing research on resources and energy.

greenhouse gas mitigation policies based on current proposals, demand for coal (including coking coal) rises by nine per cent between 2012 and 2020, and by 15 per cent by 2040. International trade plays an important part in meeting demand for coal, with Australia and Indonesia accounting for 70 per cent of the increase in global trade. Growth in global demand is more rapid under a 'business as usual' scenario, but declines by 2040 under a scenario where policies seek to prevent the rise in global temperatures to two degrees Centigrade. Even under the last scenario, however, coal continues to play a major part in meeting global energy demand, accounting for about 17 per cent of the total in 2040, compared to 29 per cent in 2012 (IEA 2014b, especially pp.56, 171).

Under the last scenario, fossil fuels more broadly are expected to account for some 59 per cent of total energy demand by 2040, compared to 82 per cent in 2012 (IEA 2014b, p.56). In short, fossil fuels, including coal, 'will continue to be indispensable if the world is to meet rapidly growing energy demand' (Pearson 2015).

In reports in 2011 and 2012, consultancy firm Port Jackson Partners concluded that Australia faced ferocious competition in seeking to win markets in Asia. The latter report includes details of the capital and operating costs for a variety of resources. According to the report:

> 'Ranked against competing producers in the thermal coal, coking coal, copper and nickel markets, more than half of Australia's mines have costs above global averages. For example, only six years ago, 63% of Australia's thermal coal production fell within the first two quartiles of the global cost curve. In 2012, this has fallen to 28%. The picture is similar in coking coal. In copper and nickel, an already weak cost position shows no sign of improvement. In both metals, nearly half of Australia's production is now in the most expensive 25% of mines globally. Even in iron ore, we have lost our operating cost advantage for all but established Pilbara operations.' (Port Jackson Partners 2012, p.25)[17]

In practice, Australia's share of the global iron ore market has increased substantially in recent years and is projected to increase further (Figure 8). BHP Billiton and Rio are at the lower end of the cost spectrum for iron ore production, but further reduction in costs will be important. In the case of metallurgical coal, Australia's market share has declined in recent years, while in steaming coal, it has remained relatively steady. Australia will face a difficult task to maintain and extend its market share in the face of the emergence of a larger number of countries as minerals and fuels suppliers.[18] For governments, productivity-enhancing reforms will remain critical. It will also be important for governments to avoid the temptation to tax mineral production too heavily. Australia will need to avoid moving too far ahead of other key suppliers in putting a price on carbon emissions if it wishes to preserve its competitiveness in the mining sector (see Sections 4 & 5).

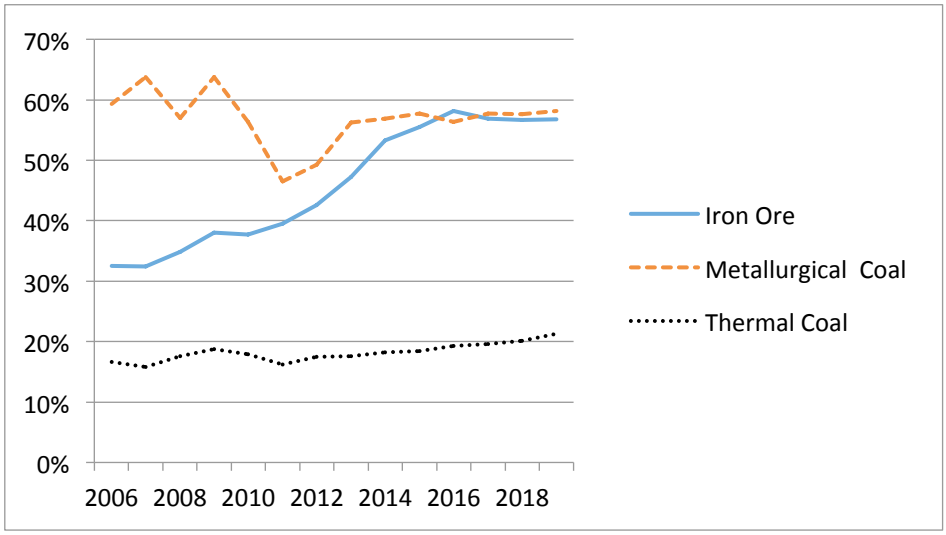
[17] These cost pressures have abated somewhat since 2011-12 but costs are still considerably above levels in 2008. For example, the average cost index for Australian coal mines increased by nearly 50 per cent for thermal coal mines between 2008 and 2011 and by over 70 per cent for metallurgical coal mines over the same period. Average costs are still around one-quarter and one-third higher respectively compared with 2008 (Calder 2014).

[18] The WTO cites research which shows that the number of countries relying significantly on resources exports increased from 58 in 1995 to 81 in 2011 (WTO 2014, p.194).

Figure 8

Australia's Market Share of Bulk Resource Commodities: Past and Projected

share of world trade by volume



Source: Department of Industry (2014, pp.48, 90), BREE (2014, pp.34, 41, 55). For iron ore, data after 2012 are forecast or projected. For coal, this applies to data after 2013.

While OECD economies typically have competitors which are mainly other developed economies, Australia's focus on exports of minerals and energy means that its competitors are mainly emerging economies. For iron ore, for example, Australia's main international competitor is Brazil and it also competes with domestic producers in China for a share of that very large market. With thermal coal, Australia's main international competition is from Indonesia, with other exporters including Russia, Colombia and South Africa. For metallurgical coal, the position is somewhat different: Australia is the dominant exporter, with other suppliers like Canada, the United States and Russia.[19] This has important implications when considering appropriate disciplines for emerging economies (see also Section 5 below).

These considerations also imply that in a world in which more countries undertake emissions abatement and in which emissions-intensive activities are likely to be subject to greater tax, regulation and review, there could well be substantial gains for both Australia and its customers if it can continue as a secure and reliable supplier of resources. By linking its comparative advantages in resources extraction and processing with greenhouse gas mitigation policies that enable agreed abatement targets (however defined) to be met at the least cost and without compromising the competitiveness of exporters relative to competitors in other economies, Australia can continue to help to underwrite the development of infrastructure and economic growth more broadly in the region.

[19] Dominance is not, of course, guaranteed in the medium and long-term. One of the lessons from Australia's experience with primary commodities (especially wool) is that sales can shift quite quickly given an incentive to do so (Stoeckel 2011).

3.3 Other OECD Economies: the Adjustment Task

OECD countries have made quite different commitments for emissions reductions by 2020 and beyond. Some, most notably the European Union, have made commitments for the second phase of the Kyoto Protocol extending over 2013-20. However, the new Kyoto commitments have not entered into force, with only 18 economies having ratified the necessary amendments to the Treaty (out of the 144 required) as at September 2014 (IEA 2014a, p.13). Many countries made pledges flowing from the 2009 UN Climate Change Conference in Copenhagen. Others have made unilateral commitments. Many countries are also likely to revise their commitments depending on what others offer in the lead-up to the Paris COP.

Table 3

Greenhouse Gas Reduction Commitments: Selected OECD Members

	2020	Longer Term Goals
Canada	17 per cent reduction on 2005 levels.	Not stated.
European Union (28)	20 per cent reduction on 1990 levels (30 per cent if there is a comprehensive international climate change agreement).	Reduction of 40 per cent by 2030 and 80-95 per cent by 2050, both on 1990 levels.
Japan	3.8 per cent reduction from the 2005 level.	80 per cent reduction by 2050
United States	17 per cent reduction from 2005 levels.	26-28 per cent reduction by 2025, with a long-term goal of an 83 per cent reduction by 2050 (both from 2005 levels).
Australia*	5 per cent unconditional reduction compared with 2000 level by 2020 and by 15-25 per cent conditional upon the terms of a comprehensive international climate change agreement	80 per cent reduction compared with 2000 level by 2050

*Note: Commitments beyond the 5 per cent reduction were made by the previous government.

Sources: European Environment Agency (2014, p.16); Executive Office of the President (2013); Hare et. al. 2015; Ministry of the Environment, Japan (2014a); US Department of State (2014, p.8); Climate Change Authority, Australia 2014a).

Table 3 sets out the commitments and goals for five players which between them account for a sizable proportion of OECD emissions. As the Table shows, the largest single OECD emitter, the United States, has undertaken to achieve reductions of 17 per cent from 2005 levels by 2020. This commitment was formally communicated to the UNFCCC in January 2010 following an announcement by President Obama in 2009 and was then conditional on both Annex 1 and the more advanced non-Annex 1 countries submitting mitigation actions (Stern 2010). More recently, it has been put forward as a US commitment within the framework of President Obama's Climate Action Plan (Executive Office of the President 2013, p.4; US Department of State 2014, p.8). The United States also has announced a target of reducing emissions by 26-28 per cent by 2025. Given domestic politics there, including

Republican control of Congress, the Administration's ability to deliver is questionable, though it will still be important politically in the lead-up to the Paris COP (see Section 4).

The European Union's commitment is to achieve a 20 per cent reduction by 2020 from 1990 levels and further reductions given appropriate commitments by other economies. It has a legislated target of a 40 per cent reduction by 2030 (European Environment Agency 2014, p.16). The European Environment Agency believes that the European Union is on track to achieve its 2020 target and perhaps to exceed it given some additional measures. Individual member countries have varying national targets within the overall EU target. In some cases, the Agency believes member states are lagging in their performance against these targets; in other cases it considers they are exceeding them.

Japan's forward commitment represents a retreat from earlier commitments. Its new commitment is for a 3.8 per cent reduction from 2005 levels by 2020, compared to a conditional target of a 25 per cent reduction from 1990 levels made previously (UN Framework Convention on Climate Change 2011). It is provisional and may be revised as Japan reviews its policies towards nuclear energy in the wake of the Fukushima disaster (Ministry of the Environment, Japan 2014a). The Japanese Government states that greenhouse gas emissions increased by 8.8 per cent from those in JFY1990 and by 6.5 per cent compared to the base year of the Protocol,[20] excluding land use, land-use change and forestry (Ministry of the Environment, Japan 2014b, p.2).

Canada's commitment, made in 2010, is similar to that of the United States. It is to reduce emissions by 17 per cent on 2005 levels by 2020. This commitment assumed that other countries would put forward emissions targets within the context of the Copenhagen Accord. The commitment represents a retreat from that under the first phase of the Kyoto Protocol, which involved a reduction of six per cent on 1990 levels by 2008-12. Canada withdrew from the Protocol, effective in December 2012. Environment Canada notes, however, that its emissions have dropped significantly since 2005 and that its 2020 emissions will be 130 million tonnes lower than a 'business as usual' scenario (Government of Canada 2015).

In some key respects, Australia's commitment to an unconditional five per cent reduction on 2000 levels by 2020 is comparable to commitments by other major OECD economies. This is illustrated in Figure 9, which uses data published by the Climate Change Authority to compare the commitments of selected OECD economies for a common base year of 2005.[21] Norway and New Zealand are outliers but Australia's reduction commitments align with those of Canada, the United States and the European Union (in terms of its unconditional pledge). Australia's commitment is also similar when comparisons of reduction efforts are made against business as usual. Figure 10, drawn from Climate Change Authority data and based on Australian Government modelling, compares Australia's target against business as usual with those for Canada, the European Union (27), Japan and the United States. Again

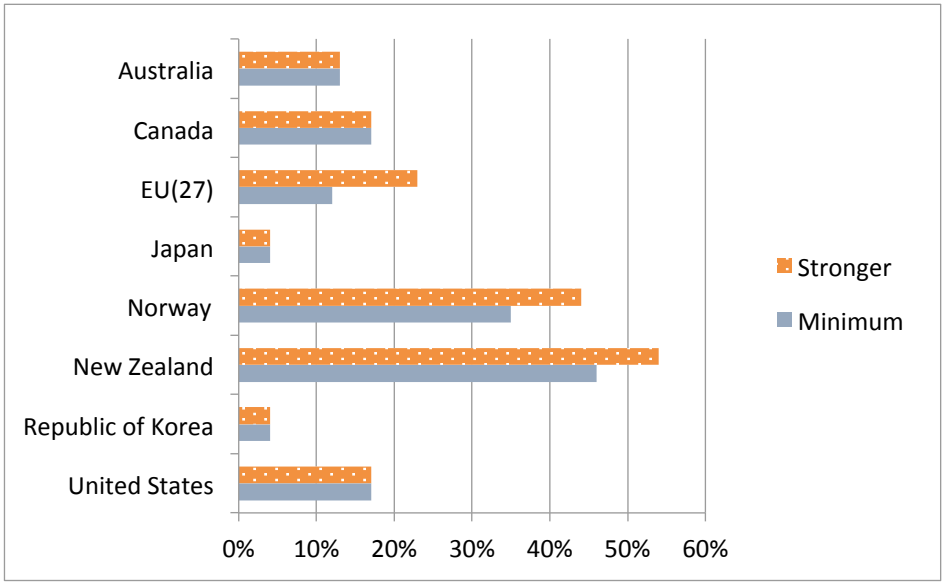
[20] For some of Japan's greenhouse gas emissions, the base year was JFY1990 and for others calendar year 1995.

[21] For Australia, the Figure does not show stronger targets for 2020 of 15 and 25 per cent which were previously made by Australia under the former Government. The 15 per cent target was conditional on major developing countries agreeing to cut emissions substantially and other advanced economies adopting commitments comparable to Australia's, while the 25 per cent target was premised on comprehensive global action aimed at stabilising emissions at 450 ppm CO_2 equivalent or lower (normally thought to be the level consistent with restricting global warming to 2 degrees Centigrade).

there is a powerful message: Australia has no need to be circumspect about its 5 per cent emission reduction target. We are doing our fair share.[22].

Figure 9

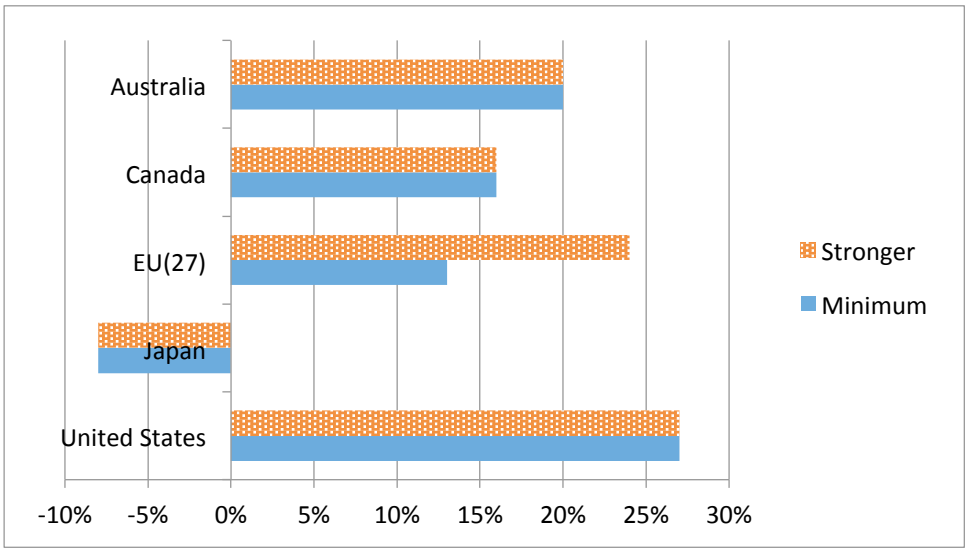
Comparative Greenhouse Gas Reduction Targets for 2020 from 2005 Base Year



Source: Climate Change Authority (2014a, Appendix B)

Figure 10

Greenhouse Gas Reduction Targets for 2020 compared to 'Business as Usual'



Source: Climate Change Authority (2014a, Appendix B)

[22] Bosetti and Frankel (2014) provide a valuable insight into what might constitute a fair share of mitigation effort relative to national circumstances. They took a large group of developed and developing countries and analysed their national unilateral pledged 2020 emission cuts relative to business as usual and their 2010 per capita incomes. The study found, among other things, that Australia was doing its fair share of abatement – less than Norway, about the same as the European Union and the United States, and more than Japan.

In some other respects, Australia's commitment to an unconditional five per cent reduction target is more onerous than commitments by other major OECD economies. This is because Australia faces higher abatement costs relative to most other developed countries owing to our large share of emissions- and energy-intensive industries and the dominance of low-cost coal in electricity generation. This is the conclusion of various studies over the last couple of decades (e.g. ABARE & DFAT 1995; Australian Government 2009; McKibbin, Morris and Wilcoxen 2010). Such studies use different approaches and metrics and produce different estimates of the economic impact of abatement among OECD and non-OECD economies, but they are consistent in showing that abatement costs are significantly higher in Australia compared with the European Union and the United States.[23] This is the case whether the scenarios modelled involve equivalent cuts in emissions or cuts in line with current national targets. They also point to the substantial difference that can exist between the apparent 'easiness' of a commitment and the effort that may be required to implement it. (See Section 5 for a brief discussion on 'comparable effort'.)

One influential approach to analysing drivers of CO_2 emissions that form the bulk of greenhouse gas emissions is to decompose them into changes in population, per capita GDP, the energy intensity of GDP, and the carbon intensity of energy use.[24] Projections of these variables provide some indication of the ease (or difficulty) with which countries can meet their commitments and help to explain the differences in the degree of effort involved in realising CO_2 emissions reductions. Table 4 provides comparative forecasts for population, per capita GDP and GDP to 2019. As the Table suggests, Australia's GDP has been increasing more rapidly than other key OECD economies (with more rapid population growth and faster per capita GDP growth). Its GDP is projected to continue to grow more rapidly than the other economies listed, indicating that its greenhouse gas obligations are more difficult to meet. The Table also provides estimates for changes in energy intensity and carbon intensity out to 2020 for some economies (not including Australia and Canada). There is a decline in both indicators for the European Union, Japan and the United States. This may reflect a variety of influences, among them technological change, changes in the structure of

[23] For example, based on Australian Treasury modelling involving varying national targets chosen to reflect each country and region making an equal reduction in emissions relative to the no-mitigation reference case post-2012, the Australian Government (2009) submission to working groups of the UNFCCC reported that reducing 1990 emissions by 4 per cent by 2020 would reduce Australia's GNP by 1.1 per cent compared with business as usual. This compared with reductions of 1.1 per cent for Canada, 0.2 per cent for Japan, 0.3 per cent for the United States, and 0.4 per cent for the European Union. McKibbin, Morris and Wilcoxen (2010) compared the impact of Australia's commitments to those of other countries against a business as usual scenario. They showed, using the G-Cubed model, that Australia's 2020 GDP is the most adversely affected of major economies or regions from policies intended to achieve targets of greenhouse gas emissions. Reducing 2000 emissions by 5 per cent by 2020 would reduce Australia's GDP by 6.3 per cent compared with business as usual. This compares with pledges by the United States and the European Union that would reduce their GDPs by 2.7 per cent and 4.9 per cent respectively against business as usual.

[24] This decomposition is based on the Kaya identity which, in the IEA's version, accounts for CO_2 emissions as the product of population; GDP per capita (with GDP at purchasing power parity); Total Primary Energy Supply as a proportion of GDP; and CO_2 emissions per unit of Total Primary Energy Supply. National figures for Total Primary Energy Supply are calculated as production + imports – exports + stock changes, with additional adjustments to subtract emissions from international marine and aviation bunkers (IEA 2014a, pp.20-21, 28). The Kaya identity is just that – an identity which is mathematically true - but it does separate out some of the key factors believed to be driving growth in emissions.

their economies (such as the continued shift towards services) and changes in the energy mix (such as changes in the relative share of coal, oil, gas, nuclear power and renewables).

Table 4

Comparative Data Relating to CO_2 Emissions: 2005-20

	Australia	Canada	EU	Japan	US
Ann. Pop. Growth, %					
2005-12	1.74	1.07	0.31	-0.02	0.85
2012-19	1.30	1.01	0.18	-0.31	0.66
Ann. Per Capita GDP Growth, %					
2005-12	1.08	0.43	0.64	0.40	0.25
2012-19	1.55	1.18	1.43	1.30	2.01
Ann. GDP Growth, %					
2005-12	2.84	1.51	0.94	0.38	1.10
2012-19	2.87	2.20	1.61	0.99	2.68
Energy Intensity					
2012	0.09	0.14	0.09	0.09	0.13
2020	n.a.	n.a.	0.08	0.08	0.11
Carbon Intensity					
2012	3.0	2.1	2.1	2.7	2.4
2020	n.a.	n.a.	1.9	2.3	2.2

Source: IMF World Economic Outlook database, October 2014 for GDP, per capita GDP and population. IEA (2014a, pp.36, 63; 2014b, p.93) for energy intensity and carbon intensity, or data from which they are obtained. The growth rates are compound annual rates. Energy intensity is measured in tonnes of oil equivalent per unit of GDP, and carbon intensity in tonnes of CO_2 per tonne of oil equivalent.

For the period to 2040 and for energy-related carbon dioxide emissions only, projections for three scenarios have been developed by the International Energy Agency, though the published results do not include data for Australia. The IEA's central projection (which involves some new greenhouse gas policies, mainly from those currently being considered) would see OECD CO_2 emissions fall from around 12 billion tonnes in 2012 to around 9.5 billion by 2040. Non-OECD CO_2 emissions would rise from about 18.5 billion tonnes in 2012 to almost 27 billion in 2040. This would occur in spite of a slight decline in China's CO_2 emissions between 2030 and 2040. India's emissions would more than double over 2012-40. Under assumptions intended to limit global warming to 2 degrees Centigrade, CO_2 emissions would decline much more abruptly in OECD economies and would fall after 2020 for non-OECD economies (IEA 2014b).

4. International and Domestic Policy Context: agreement on need to change

There is broad agreement that developed and developing countries must make internationally-coordinated progress in addressing climate change. This understanding is vague and should not be equated with taking specific action under legally binding international commitments that apply equally or mostly to both developed and developing countries. But it is a significant difference from the position a few years ago when developed

countries were committed to certain internationally binding targets and developing countries were bound only by policies and targets (if any) determined by national governments

The US-China agreement on climate change, announced at the 2014 APEC Leaders' meeting, has raised expectations about reaching an internationally co-ordinated agreement in Paris. It indicates a willingness by the United States to do more than it might otherwise have been comfortable doing, and it puts China's domestic aspirations for improving energy efficiency into an international context. But beyond the numbers, the agreement's importance arises from the reality that the world's two largest economies have signalled their intention to cooperate on climate change (which was not the case at Copenhagen), and that they are starting to frame international discussion in terms of opportunities to be seized rather than burdens to be shared.

Changing the atmosphere is this way does not mean that negotiations will be easy. The Lima climate meeting bogged down on burden sharing, and this will remain a formidable stumbling block as it has been in international negotiations since the New International Economic Order started to be discussed in the 1970s. The United States and European Union are divided over less formal, 'bottom up' approaches favoured by the Americans and 'top down' or Kyoto Protocol style approaches favoured by the Europeans. The United States and China have different views over what might constitute reasonable transparency of policy actions. And there are unresolved issues between developed and developing countries over issues such as climate-related assistance and access to intellectual property. But while certainly not easy, the Paris COP is more likely to deliver tangible outcomes than the Copenhagen COP in 2009. The reasons for this are:

- The United States is becoming more active in driving international action to achieve a modest outcome. This stance is different from at Copenhagen where the Administration was grappling with the effects of the Global Financial Crisis. Of course, distinguishing between commitment and rhetoric is difficult. US rhetoric on climate change has ramped up recently: for example, the 2015 State of the Union Address identified climate change as a primary threat to future generations and an immediate risk to US national security.[25] But US capacity to act on climate change also has ramped up because, Congressional politics aside, the shale gas revolution provides the United States with the means to make progress on emissions abatement without significantly damaging core economic interests.
- China has moved considerably in the last few years. Five years ago it was in the same camp as India and Brazil. It still shares many of their views, especially on special and differential treatment for developing countries. But it now sees political and economic advantages in taking a more nuanced stance on climate change. Politically it is valuable to develop a more positive additional strand in its relationship with the United States. Economically it is valuable because it provides a small degree of external pressure to drive what the Chinese already want to do in terms of improving energy efficiency and building green industries.
- The European Union (unsurprisingly) is pushing for a Kyoto Protocol style outcome at the Paris COP.

[25] The State of the Union speech sets out US determination to drive international action on climate change and emphasises the US-China agreement of emissions as a nucleus around which other nations might come together and agree on coordinated actions "to protect the one planet we've got."

- The process of early announcements of nationally determined targets in the lead-up to the Paris COP contrasts with Copenhagen where parties did not announce their targets until just before the conference. This more open process reduces the possibility of nasty surprises and should contribute to a more positive atmosphere.[26] Major governments do not want a re-run of the Copenhagen COP.
- And there is growing interest around the world in emissions mitigation either as an end in itself or linked in various ways to policies that promote energy security, better air quality and new technologies.[27]

Trying to identify possible outcomes from the Paris COP is very difficult. Over the next few months countries will start to firm up their intended national contributions. While intended targets will not be binding under international law, national governments will watch each other and make judgements about their initial offers and the scope for improving them through the course of negotiations. Arriving at a set of pledges from key countries will resemble transforming subtle changes in the mood music of negotiations into something that is more quantitative, though hedged with caveats. But this will still be progress. In all likelihood, nationally determined targets, when aggregated, are unlikely to produce outcomes that are consistent with restricting global warming to 2 degrees Centigrade. If this is the case, there is an expectation on the part of several governments, including the Australian Government, that a process can be agreed to achieve substantial emissions reductions over the long term. One possibility might be to create long-term pathways to, say, 2050 to give direction to national governments. Another might be agreeing a cycle of reviews or renewed contributions every five years or so.

Either possibility would be a reasonable outcome from the perspective of reducing the adjustment burden on national economies and moving incrementally to a low carbon economy. But there is a caveat. Some governments in Europe and among small island states, as well as some non-government organisations, will intensify their efforts in the lead-up to the Paris COP and at the COP itself to impose stringent post-2020 abatement targets and commitments based on moving as quickly as possible on the two degree Centigrade goal. In a politically charged environment, there is a risk that governments, particularly in developed countries, might make offers without fully considering the effectiveness and efficiency of those offers. If that proves to be the case, it is essential that they have a clear understanding of the economic and trade implications (see Section 5).

Beyond the Paris COP it is even more difficult to predict outcomes. One reasonable prospect is that most countries are unlikely to make binding commitments to reduce emissions by a given percentage from a given historical date. Their national pledges may firm up over time

[26] The United States, the European Union, Norway, Switzerland and Mexico will announce their national targets for the Paris COP in the first quarter of 2015. Others might also opt for this timing. Australia, Canada, China, Japan, and New Zealand have indicated that they will announce their targets around mid-year. Most major developing countries are expected to announce their targets nearer to the COP.

[27] An example is the increasing number of emissions trading schemes: they operate in the European Union, some Chinese provinces, Quebec, California, some states in the northeast of the United States, Kazakhstan, Switzerland, New Zealand, and Japan (Tokyo), and more are under consideration in countries like South Korea, India, Chile, Brazil, Thailand, and Mexico (IEA 2014c, pp.10-11). Other examples include regulatory measures such as Australia's Direct Action Plan.

and must be credible but they will still tend to be fairly loose in terms of specificity and in the institutional arrangements for monitoring and enforcing.

Another reasonable prospect is that countries will continue to see climate negotiations both in their environmental and economic dimensions. The UNFCCC process may focus on the science and broader policy issues, but the economic and trade sub-text is there and is at the forefront of the minds of governments.

Over the long term, say the next 10-15 years, it is possible (though still unlikely) that a sub-group of countries might come together to negotiate some internationally binding hard targets. But whether this happens or not will depend on outcomes that are difficult to predict such as US-China relations on a broad range of geo-political, security, economic, trade and environmental issues; Congressional politics in the United States; the strength of continuing opposition to broad-based, binding international arrangements on climate from countries like India[28] and Brazil; and the resolve of countries like the United States, China, the European Union and Japan to engage in what would be a very difficult negotiation.

Developments in international climate policy in the lead-up to the Paris COP will inevitably play a part in shaping discussion in Australia about our 2020 and post-2020 targets, commitments and processes. The hard question is the Australian Government's resolve to balance environment, economic and trade objectives in preparing for the Paris COP and beyond, particularly in a situation where Australia may be isolated, or partly isolated, from traditional like-minded countries.

Australia's national interest is served by working actively to be part of any global solution. Some basic considerations that should guide and inform policy development are discussed next.

5. Policy priorities

The future of economies or of particular industries is never exactly like the past: economic circumstances change and domestic and international policies change in response to, or in anticipation of, that change. But in formulating policy, it is important that government interventions work generally to enlarge economic opportunities for business, and vital that they do not diminish them. This is critical in relation to international and domestic climate policies and Australia's resources sector. Whatever comes out of those policy processes must leave Australia with minerals and energy industries that are internationally competitive, can respond to opportunities as they arise and can generate wealth and high wage jobs across the economy. This is why achieving this goal requires action from government domestically and internationally.

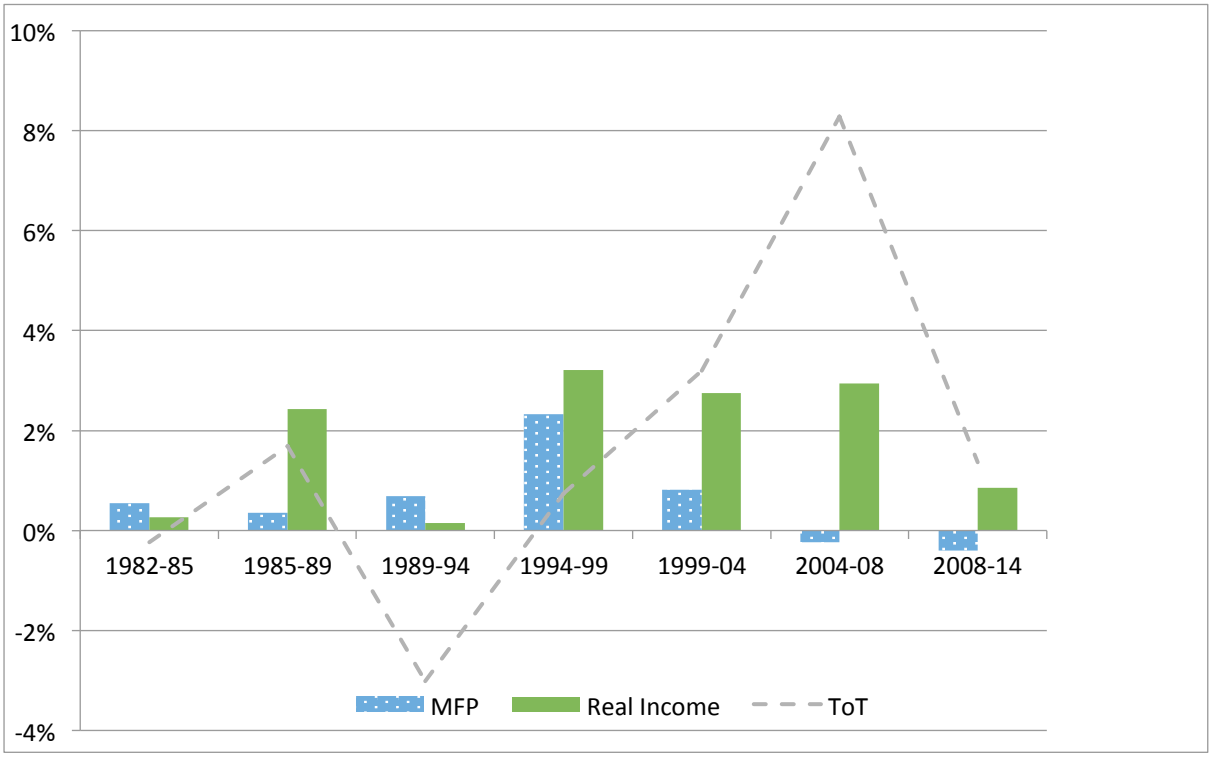
Domestically, Australia's future prosperity depends on lifting productivity performance to boost growth and high wage jobs in a challenging environment: the global economy remains

[28] Prime Minister Modi's political longevity depends, to a large extent, on lifting tens of millions of Indians out of poverty. Among other things, this means increasing supplies of cheap assured energy by whatever means are available and therefore boosting emissions into the long term. Many developing countries will shelter behind India's position.

fragile, Asia's rise creates both opportunities and new competitors, mining investment declines from historical highs and the terms of trade may decline further, and consumers and business investors remain cautious. Productivity growth has been disappointing in the 2000s in contrast to generally strong growth during the second half of the 1990s and early 2000s (Figure 11). Improving productivity performance means focusing once again on an ambitious program of economic reform that includes more flexible labour and product markets, more emphasis on fiscal sustainability and why this matters to Australia's future prosperity, and a commitment to tax reforms that respond to what comparable countries are doing to bring their tax regimes into the 21st century (Parkinson 2014a).

Figure 11

Changes in Real Per Capita Income, Productivity and the Terms of Trade



Source: ABS Cat. 5206.0, September 2014 and 5260.0.55.002, 2013-14. MFP refers to multifactor productivity, real income to real net disposable income per capita and ToT to the terms of trade. All series measure average annual changes. Data are for fiscal years. MFP here is for 12 selected industries, with labour input on a quality adjusted hours worked basis. The last productivity cycle shown is incomplete.

Pursuing this agenda is not easy. The major parties are at odds over the need for reform federally; labour market reform 'is close to a no-go area'; the public debate on fiscal policy 'plays out in ways that seem to assume that fiscal sustainability is irrelevant to Australia's future' (Parkinson 2014b); and the rationale and urgency for reform are not understood widely in the community.[29] But however difficult, improving productivity is essential if

[29] The lack of public understanding on the need for economic reform is not surprising given the absence of thorough public discussion on the issue, low public indebtedness and unemployment compared with many other developed countries, living standards that have risen appreciably over the past decade, and the difficulty of distinguishing between improvements in real income driven by historically high terms of trade and increases driven by generalizable improvement in the ways Australians work and use technology (Figure 11).

Australia is to maintain growth in living standards and if the minerals sector is to catch the next wave of gains from minerals resource development.

More specifically on climate policy, Government must be consistent and clear about its broad objectives, post-2020 emissions reductions targets and the framework for achieving those objectives and targets. Having targets that are appropriate for Australia's emissions profile is essential, but this requires government being informed about the economic and trade implications of different emissions targets. Being informed, in turn, requires careful dialogue with business reinforced by having up-to-date modelling results readily to hand. In the twists and turns of international negotiations, outcomes are difficult to predict, but it is important that decisions are made in full knowledge of their likely implications.

Internationally, Australia's policy developments in the lead-up to the Paris COP need to be guided by three core considerations. First, Australia's approach must be credible in the sense that its proposals must be supportive of delivering an internationally co-ordinated approach to addressing rising emissions and the effects of climate change. The Government is focusing on the long-term pathway to achieve the 2 degrees goal. This approach will be criticised by various green groups but appears to be consistent with the approach being proposed by most other countries.

Second, climate change policy should provide for a measured transition to a low emissions global economy that minimises adverse social and economic impacts. Australia has long held the view that the economic burden of abatement borne by Australia should be no greater than the burdens borne by other advanced countries as measured by, say, the impact of abatement on GDP. This view acknowledges that per unit abatement costs vary greatly between countries as a result of their different economic structures, pace of economic and population growth, geography, and resource endowments; highlights the fact that a one size fits all approach to abatement cannot logically work effectively among many countries with many different interests; and gets to the heart of what constitutes an economically fair share of abatement obligations by comparable economies. A narrative needs to be developed around our national differences.

To some extent, that narrative has been evolving over the last decade around the concept of 'comparable effort'. Elements of Australia's position include that developed countries should make mitigation commitments that are comparable, taking into account their national circumstances; comparable effort is critical to achieving the ultimate objective of the UNFCCC of preventing dangerous anthropogenic interference with the climate system; economic costs of mitigation are directly relevant to assessing comparable effort at the national level as they reflect the size of a country's structural adjustment task; and economic costs of mitigation vary significantly from country to country owing to differences in national circumstance.

Australia's distinguishing characteristic as a great resources exporter with continuing high dependence on fossil fuels defines a major element of its interest in international climate change negotiations. Measures that raise the costs of producers of emissions relative to overseas competitors compromise their competitiveness and are akin to imposing a tax on exports and a subsidy on imports (Stoeckel 2011). This suggests that in its domestic policies and international climate change forums, Australia should be encouraging approaches that target consumption of emissions rather than their production (Box 1 and Attachment A).[30]

[30] This might mean for instance, that measures targeting embodied emissions in exports are not levied until consumed in the country of destination. This is analogous to exports being exempt from the goods and

Winning domestic and international support for an approach that accommodates different abatement costs and constraints will not be easy because discussions about issues like simple targets are, on the surface, much easier than discussions on 'uniqueness' and 'distinctiveness' that inevitably broach issues like modelling, methodologies and assumptions. Some progress has been made on recognising national circumstances – the Lima climate conference is the latest confirmation of this - but it is essential that Australia continues to advance the argument and continues to resist pressures to commit to targets, both to 2020 and post 2020, that would impose major additional abatement costs on the economy that are disproportionately high compared with other comparable economies and key competitors.

Commitments post-2020 must also be comparable. Agencies like the Climate Change Authority (2014a) argue that Australia should aim to reduce emissions by 40-60 per cent below 2000 levels by 2030 and that this is needed to "drive steady transformation of the Australian economy" and keep Australia competitive in a low carbon world. Australia should indeed shoulder its fair share of abatement responsibilities – this is certainly in our long-term interests – but enthusiasm for ambitious targets must be tempered by practical concerns about maintaining economic growth, taking on costs in line with those of comparable countries, maintaining the competitiveness of major industries that have contributed so substantially to Australia's wealth and to the development of countries like China and India, and the timing of commercially available low emissions technologies.[31] Enthusiasm also must be tempered by the sheer difficulty of estimating the economic impact of mitigation policies, particularly over relatively short periods of time. This is because outcomes depend on numerous factors, including the choice of policy instruments, the magnitude and speed of implementation, the take-up of policies by key competitors, general economy-wide impacts and how they flow back to particular sectors, and flow-on effects for trade and trade policy.

A third core consideration that should guide Australia's approach to climate policy development is the need to prevent climate policy rubbing against trade policy and specifically the need to keep trade open. Over the last few years Australia has negotiated important trade agreements with major economies aimed at strengthening overall relationships and improving movement of goods, services, investment and skilled workers. The minerals sector has benefitted from this work, particularly in terms of relationship building and outcomes on tariff escalation for processed minerals. It is essential that this work, along with the trade and investment opening measures negotiated by others, are not in any way undermined by 'green protectionism'.

Academic literature is brimming with possible environment-related trade policy measures to accelerate the decarbonisation of economies and international trade. Examples are border carbon adjustments, 'environmental tariffs', export taxes on resources and energy, import bans or punitive tariffs (a variant on anti-dumping) on imports from countries deemed to have insufficient domestic carbon regulations, various regulatory standards on carbon embodied in imported products, and regulatory co-operation that commits participating countries to maintain regulations of comparable stringency. This is particularly concerning in an

services tax (GST). Conversely, as is the case with the GST, emissions embodied in imports would be targeted along with emissions embodied in domestically produced goods and services (Carmody 2009; Stoeckel 2011).

[31]Carbon capture and storage is one such technology with a potentially vital role to play in the global transformation to a sustainable low-carbon economy in power generation and industry. IEA analysis suggests that CCS will contribute around one-fifth of required emissions reductions to 2050 (IEA 2012).

environment where world trade growth is subdued and less responsive to changes in global real GDP (World Bank 2015, pp.169-70), and where the stock of trade restrictive measures continues to increase, though without a generalizable outbreak of protectionism (OECD, WTO, UNCTAD 2014).

Trade openness and environmental protection both contribute to sustainable development. Trade contributes through being an engine of growth and promoter and disseminator of improved technologies and skills (for example in relation to improving energy and carbon intensities of production). Environmental policies contribute directly through their impact on mitigation and adaptation and therefore through technological change. It is vital that climate and other environmental policies do not become an obstacle to trade which, fundamentally, is part of any solution to addressing climate change effectively.[32] This fact underlines the significance of the Paris COP: outcomes must be sufficiently credible to prevent the proliferation of bilateral and regional climate initiatives that might inhibit trade and investment.

6. Conclusion

The effectiveness of arguments based on the principle that advanced countries carry broadly similar costs of abatement will only be as good as the evidence-based analysis that support them. This paper has attempted to gather together some of that evidence - why the resources sector is important to Australia's future; what is driving emissions growth in Australia and how this compares with emissions growth in comparable countries; and how Australia's abatement commitments compare with other countries. The aim is to help inform policy makers in preparing for the Paris COP and contribute to a more factually-grounded public discussion on climate change mitigation and the contribution of the resources sector. But if the business community is going to contribute to a more factually grounded discussion that potentially feeds into the Government's offensive and defensive briefs for the Paris COP, it also will need to be clear on a number of issues. They include what Australia's main competitors are doing in practice to mitigate climate change (because this might not always be apparent from governments' policy statements), preferred policy options for achieving Australia's post-2020 mitigation objectives, the economic and trade implications of different national abatement commitments, and the international processes that might be worth pursuing or reinforcing to advance Australia's business interests.

[32] For a fuller discussion on trade and climate change policies see Adams, Brown & Wickes 2013, pp.264-66.

Attachment A

Australia's Production and Consumption of Emissions

If a country produces more emissions than it consumes, it is a net exporter of emissions and it is a net importer if it consumes more than it exports.

Countries that are net importers are, in effect outsourcing the production of emissions embedded in their economic activity to countries that export emissions. Prominent net importers of emissions include European Union countries, the United States and Japan. China, which exports embedded emissions in its manufactures exports, is the world's largest net exporter of emissions, followed by Russia, India, South Africa and Saudi Arabia.

Estimating consumption of emissions is complex. It requires assumptions about the way goods and services are produced and the use of input-output models, which describe the transformation of goods and services along supply chains. There have been significant advances in the development of these estimates in recent times, and the research is substantial, but as yet there is no internationally accepted framework and methodology.

The weight of available evidence suggests that Australia is a net exporter of emissions. Data from the Australian Bureau of Statistics (ABS) and the Global Carbon Project indicate that Australia is a net exporter of emissions. OECD estimates, on the other hand, suggest that Australia is a net importer.

ABS

ABS 'experimental' data show Australia was a **net exporter** of emissions in 2008-09 (ABS 2014). Production-based emissions were 585 Mt CO_2-e and Consumption-based emissions were 531 Mt CO_2-e. The net trade balance of embodied emissions was therefore 54 Mt CO_2-e.

- 228 Mt CO_2-e emissions were induced by exports and 174 Mt CO_2-e were embodied in imports.
- Of the emissions induced by exports, 37 Mt CO_2-e were from agriculture, forestry and fishing, 68 Mt CO_2-e were from mining, 90 Mt CO_2-e from manufacturing and 32 Mt CO_2-e from Services.

A useful summing up of the ABS estimates is provided by Deloitte Access Economics (2014, p 10):

> 'The ABS estimated consumption based emissions by netting off exported emissions and assuming that imported products were produced using production functions that were identical to those used for locally produced products of the same type. … The ABS analysis provides valuable insights into the link between domestic economic activity and emissions, but is limited in relation to providing a foundation for making comparisons between countries due to the fact that the different emissions intensity of production in different countries is not taken into account. In particular, we note that the ABS considered that its approach may overstate imported emissions for Australia.'

Global Carbon Atlas/Project

Global Carbon Project estimates, which use territorial emissions data from the Carbon Dioxide Information Analysis Centre (CDIAC) (Boden, Marland and Andres 2013) and consumption emissions data based on Peters et al (2011), show that Australia was a small net exporter of emissions in all years since 1990. Annual net exports ranged from around 15 Mt CO_2 to 55 MtCO_2 (see Figure 5).

These data cannot be compared directly with the ABS numbers because they include only emissions from fossil fuels (in particular, carbon dioxide emissions from the combustion of burning coal, oil, gas, the process of gas flaring and the manufacture of cement).

- In 2009, Australia's 'territorial 'emissions were 395 Mt CO_2 and 'consumption' emissions were 358 Mt CO_2, providing a net 'transfer'/export of emissions of 36 Mt CO_2.
- In 2012 Australia's 'territorial 'emissions were 353 Mt CO_2 and 'consumption' emissions were 338 Mt CO_2, providing a net 'transfer'/export of emissions of 15 Mt CO_2.

OECD

OECD estimates of carbon dioxide emissions embodied in international trade show Australia to be a **net importer** of emissions. In 2009, production-based emissions were 384 Mt CO_2 and consumption-based emissions were 415 Mt CO_2, resulting in net imports of emissions of 31 Mt CO_2. Earlier estimates for the period 1995-2000 show Australia to be a net exporter of emissions.

These estimates are based on IEA data, which cover CO2 emissions from fuel combustion (IEA 2012; OECD 2013; OECD 2014). Again, there is useful commentary from Deloitte Access Economics (2014, p 10):

'The OECD published estimates of consumption and production based emissions for member countries, using a [Multi-region input-output models] (MRIO) approach. … We note that the OECD's methodology incorporated adjustments to deal with measurement issues, such as re-exports, unspecified partners and commodities and missing data, particularly for trade in services.'

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