MINERALS COUNCIL OF AUSTRALIA

SUBMISSION TO

THE CLIMATE CHANGE AUTHORITY'S SPECIAL REVIEW

SECOND DRAFT REPORT

FEBRUARY 2016

EXECUTIVE SUMMARY

The Minerals Council of Australia welcomes the opportunity to provide comment on the Climate Change Authority's Second Draft Report of its Special Review into Australia's climate policy options. This paper complements our previous submissions.

The Australian minerals industry recognises the need for a measured transition to a low emissions economy through policy settings that are globally aligned, calibrated with global action, use market mechanisms for cost-effective mitigation, and is focussed upon technological development.

The Minerals Sector's Statement of Principles on Climate Change Policy state that it is 'imperative for all nations to sustainably reduce the production and consumption of greenhouse gas emissions without compromising international competitiveness, energy security and economic growth, improved living standards and poverty alleviation'.

The success of Paris climate talks in reaching the next iteration of a global action, setting a reduction path and providing a basis for nationally differentiated action to limit temperature rise over the century to less than 2 degrees, opens an important new phase. It marks the beginning of a more globally aligned policy framework. That said, global action will remain uneven for some time and will require careful calibration of domestic policy settings.

In Australia, there have been important lessons over the past ten years about getting the policy mix right: the importance of energy and economic security alongside climate management goals; the need to use market mechanisms for least cost abatement; to establish a price signal not a revenue raising device; and the importance of co-operating with trading partners for mutual economic and technological benefit.

In this context, the minerals industry favours a gradual evolution of policy instruments rather than wholesale and disruptive changes.

Mechanisms

The minerals industry supports the use of market mechanisms that are:

- Internationally calibrated
- Comprehensive in coverage
- Provide protection for trade exposed and/or emissions intensive operations
- Not a revenue raising vehicle (accepting the need for adequate compensation for the disadvantaged).

There is a range of market mechanisms in place around the world, including cap and trade, baseline and credit, and technology schemes. While noting some political debate about the Emissions Reduction Fund/Safeguard Mechanism, the minerals industry regards it as a type of market mechanism.

All emissions trading style market mechanisms have broad protection for trade exposed and emissions intensive industries, more extensive than for the now repealed Clean Energy Future scheme. Recognition of trade exposure and/or emissions intensive factors are at the heart of design and ongoing operation of all systems around the globe.

According to the World Bank, there are 40 jurisdictions and 20 cities, states and regions that account for 25 per cent of emissions with some carbon pricing instruments. However, only 12 per cent of actual emissions, less than half of the covered emissions, are subject to trading. The Paris talks have set a pathway which may see this coverage increase. The pace or breadth of this change cannot be known at this point. This means that policymakers must design policies that are calibrated to international developments now and in the future. Constructing policy only on presumptions about future development will lead to higher cost.

The technology path

While historically Australian policy makers have taken their lead from European and US developments, future policy must also be focused on Asia and specifically integrated with the economic, energy security and climate management priorities of the region.

Australia's energy exports remain vital to the development of our region. The prospects for Australian coal and uranium exports in the medium to longer term remain healthy due to specific market conditions. The International Energy Agency's assessment of demand through to 2030, based on the intended nationally determined contributions made by countries at the Paris talks, sees a potential 37 per cent increase in export coal and 84 per cent increase in export uranium through to 2040. This shift in coal demand is particularly noteworthy. The IEA Clean Coal Centre estimates that in China alone, more than 479 million tonnes of CO_2-e has been avoided through the switch to more efficient high efficiency low emissions (HELE) coal-fired power generation. Nuclear power, with close to zero emissions, is also playing a significant part in shifting the long term assessment of emissions over the coming century.

Carbon capture and storage will play a vital role. The IEA chief executive Fatih Birol has stated numerous times, including during his trip to Australia in February, that CCS is 'essential' and without wider deployment of the technology it will be 'very difficult' to reach the 2 degree target.' [1]

As the competition between suppliers and energy sources increases globally over coming decades, Australia retains a comparative advantage in the quality of its product (and for coal, its use in more efficient, lower emissions power plants), its cost-efficient reliable supply capability and its application of technology to reduce the emissions of production.

[1] F. Birol, Presentation by the International Energy Organization Chief Executive Office at the Australian Parliament House, 9 February, 2015.

Box 1: Minerals Sector Statement of Principles on Climate Change Policy

The minerals industry acknowledges that sustained global action is required to reduce the scale of human induced climate change.

A measured transition to a low emissions global economy will require the alignment of three key policy pillars:

- **A global agreement** for greenhouse gas emission abatement that includes emissions reduction commitments from all major emitting nations
- **Market-based policy measures** that promote the abatement of greenhouse gas emissions at the lowest cost, while minimising adverse social and economic impacts, including on the competitiveness of the internationally traded sector
- **Substantial investment** in a broad range of low emissions technologies and adaptation measures.

In the absence of a global agreement in the near term, the imperative for all nations is to sustainably reduce the production and consumption of greenhouse gas emissions without compromising international competitiveness, energy security and economic growth, improved living standards and poverty alleviation.

A measured transition to a low carbon economy can be accomplished by a variety of policy mechanisms that integrate all of the following design features:

- **Clear, predictable and long-term price signal** – ensure that carbon price signals influence producers and consumers such that emissions and carbon consumption are reduced, and the focus on low carbon technologies is increased.
- **Broad based –** cover the broadest possible range of greenhouse gas emission sources, sinks and low carbon energy options.
- **Internationally competitive** –progressively reduce emissions without distorting trade and investment flows or compromising the international trade competitiveness of Australian industry.
- **Revenue neutral** – the objective is to establish a carbon price signal to change behaviour not raise revenues – if revenues are raised, they should be used to provide assistance to individuals and firms adversely affected by the policy measures, not be diverted into general revenue.
- **Simple and effective** – to achieve sustainable emissions reductions at least economic cost, and be simple to implement.
- **Measured, equitable transition** – to avoid adverse economic and social consequences, ensure continued energy security and provide equitable treatment of existing investment and greater certainty to new investment. Transitional measures to maintain trade competitiveness should be non-discriminatory.
- **Technology** – encourage the adoption of the most efficient low emissions technologies through a carbon price signal, and fiscal measures where market failure can be demonstrated.

Consultation on these policy measures should be conducted in an open and transparent way, and include genuine consultation with all stakeholders.

February 2011

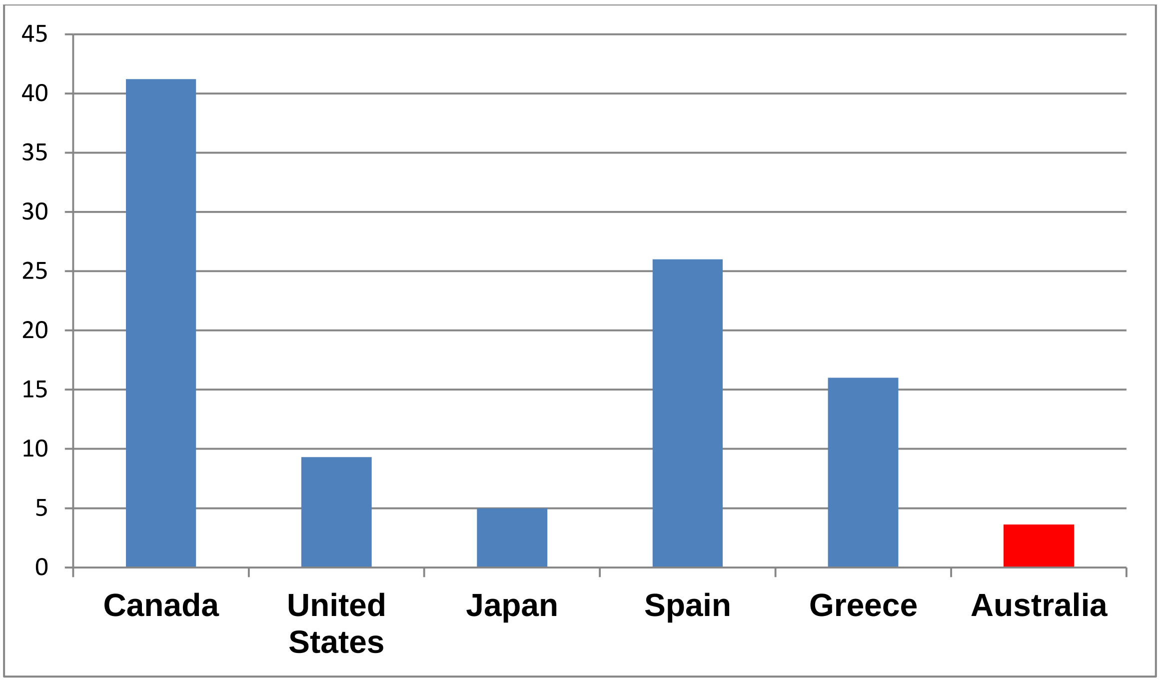
1. AUSTRALIAN HAS CONTRIBUTED TO INTERNATIONAL EFFORTS IN THE TRANSITION TO A LOW EMISSIONS ECONOMY

For the past 25 years, Australia has outperformed most developed and developing nations in constraining the growth of CO_2-e emissions.

Under the Kyoto Protocol commitments, between 1990 and the average of 2008-2012, Australia's CO_2-e emissions grew by just 3.6 per cent. In contrast, CO_2-e emissions in the United States grew by 9.3 per cent. Canadian emissions grew by 41.2 per cent, New Zealand's emissions grew by 70 per cent and Japan's grew by 5 per cent.[2] The significant fall in the European Union's emissions can be mainly attributed to collapse of industry in East Germany following the collapse of the Berlin Wall. The same phenomenon was observed in former Eastern European states. Nevertheless, emissions in many developed European nations grew strongly over the two decades. For example, Spain's emissions grew by 26 per cent, Greece's by 16 per cent and Ireland's by 11.6 per cent.[3]

In the developing world, emissions grew exponentially as nations put economic development and the alleviation of poverty as the priority. China's CO_2-e emissions grew by 339 per cent between 1990 and 2010, while India's doubled.[4]

Chart 1: Net emissions performance 1990 to 2008-12



Sources: Climate Analysis Indicator Tools (CAIT), World Resource Institute, European Commission, BR CTF Submissions to UNFCCC

Australia's 'carbon productivity' (CO_2-e emissions per dollar of gross domestic product) also improved faster than most economies. In particular, Australia's emissions per $ of GDP have improved by 50 per cent since 1990. This is projected to fall to as much as 70 per cent by 2020.[5] This compares

---

[2] National Inventory Reports to the UNFCCC. http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/7383.php . Australia and EU use average across 2008-2012; others use 2008-2011. Final report under the first commitment period due later in 2015. All figures except EU include land use, land use change, and forestry (LULUFC).

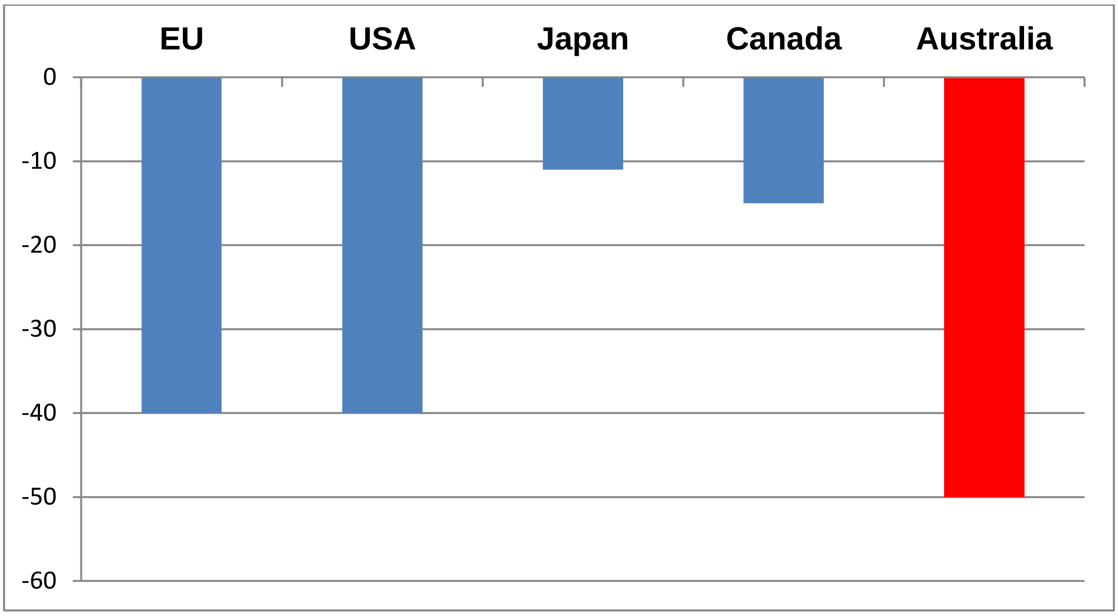
[3] National Inventory Reports to the UNFCCC using base year and average of 2008-2011.

[4] A. J. Leggett, China's Greenhouse Gas Emissions and Mitigation Policies, Congressional Research Service, July 18, 2011, p. 9; For India http://edgar.jrc.ec.europa.eu/overview.php?v=GHGts1990-2012 .

[5] Deloitte Access Economics, *Long term economic and demographic projections*, November 2011.

with a 40 per cent improvement in both the European Union and the United States. Canada's carbon productivity improved by 15 per cent over this period while Japan's increased by 11 per cent.[6]

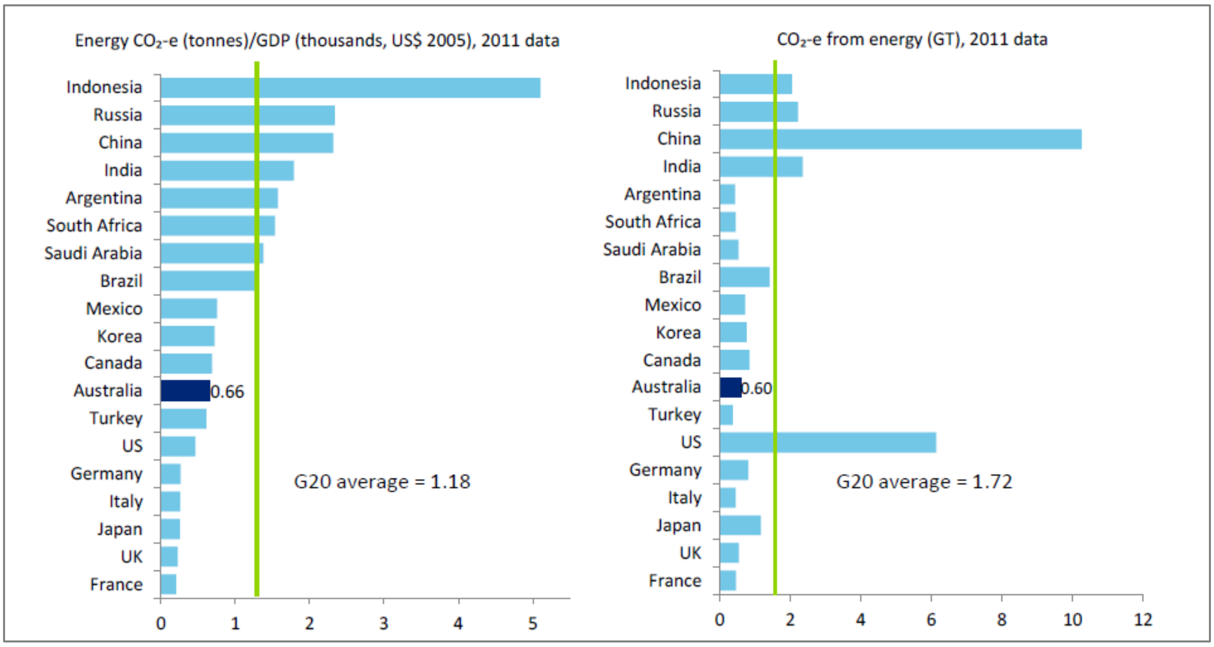
Chart 2: Carbon Productivity: Reduction in CO_2-e per dollar of GDP between 1990 and 2008-12



Source: Brown, Adams and Wickes 2015

The emissions intensity of Australia's economy ranks favourably with most other major economies.

Chart 3: Emissions intensity performance: G20 nations



Source: World Resources Institute data, IEA data, Deloitte analysis
Note: Includes emissions from land use and land use change and forestry

[6] N. Brown, M. Adams, R. Wickes, *Climate Policy and Australia's Resources Trade*, Report for the Minerals Council of Australia, 2015.

2. FUTURE POLICY APPROACH

Australia must take a rational and informed approach to its climate policy settings, one which recognises the indispensable role that Australia plays in providing protein, fibre, resources and energy to countries with no such endowment of their own. Thirty per cent of Australia's emissions are generated in these exports.

Australia's economic structure is distinctive amongst developed nations

The resource and emissions intensity of our economy and trade, our relatively fast trend rate of economic growth and our fast population growth make Australia very distinctive among advanced economies.

Minerals and energy exports, for example, account for nearly 60 per cent of Australia's merchandise exports, compared with the OECD average of around 11 per cent. This distinctiveness needs to be taken fully into consideration by Australia's policymakers in considering Australia's emissions targets and policy tools.

Targets and tools must take account of the great differences in projected population growth over the period to 2030. According to United Nations projections, Australia's population will grow by 16 per cent (3.8 million people) between 2015 and 2030. Over the same period, Germany's population will fall by 4.7 per cent (3.9 million), Japan's by 6.7 per cent (8.4 million), Russia's by 6.5 per cent (9.3 million) and Italy's by 2.7 per cent (1.7 million).

In 2009, the Australian Treasury analysed the comparative costs of various nations' 2020 emissions reduction targets. While Australia's headline emissions reduction target was lower than other nations, the economic cost of those targets was higher than for most developed nations.

The Australian Treasury analysis concluded that:

> The analysis shows that Australia faces high economic costs, relative to most other developed countries, due to its large share of emission- and energy-intensive industries and a dominance of low-cost coal in electricity generation.[7]

The analysis showed that Australia's minus 5 per cent target would result in a loss of gross national product three times that experienced by the EU in pursuing a minus 20 per cent target. These findings reflect the fact that the costs of abatement in the Australia economy are high.[8]

Analysis of past published Treasury by the Centre for Independent Economics Australia's total cost of abatement is at least 50 per cent higher than the global cost depending on the scenario. This is outlined in Box 2.

Box 2: Higher cost explained

In economic terms, effort can be understood as the resources foregone in order to achieve a particular abatement target (resources that had alternative uses in pursuing other economic objectives). These foregone resources can be measured as the cost of abatement, and so comparative effort involves, in part, understanding the comparative costs of abatement between countries.

A large part of choosing the target is therefore in understanding these comparative costs. Setting targets without an understanding of costs is irresponsible and potentially self-defeating if costs are too large, misunderstood or not well managed.

---

[7] Australian Government, *Economic cost as an indicator for comparable effort*, Submission to the AWP-KP and AWG-LCA, May 2009.

[8] This has been recognised by Australia since the beginning of the Kyoto Protocol, See the Hon. Senator R. Hill, *Statement to the Fourth Conference of Parties to the UNFCCC,* Buenos Aires, 1998.

The cost of a particular abatement target depends on a variety of factors that can be divided into three broad sets:

- The level of business as usual (BAU) activity; that is, the expectation of where growth would be without any abatement
- The ability of the economy (both technical and structural) to substitute into new, lower emission activities
- The magnitude of the abatement target relative to business as usual.

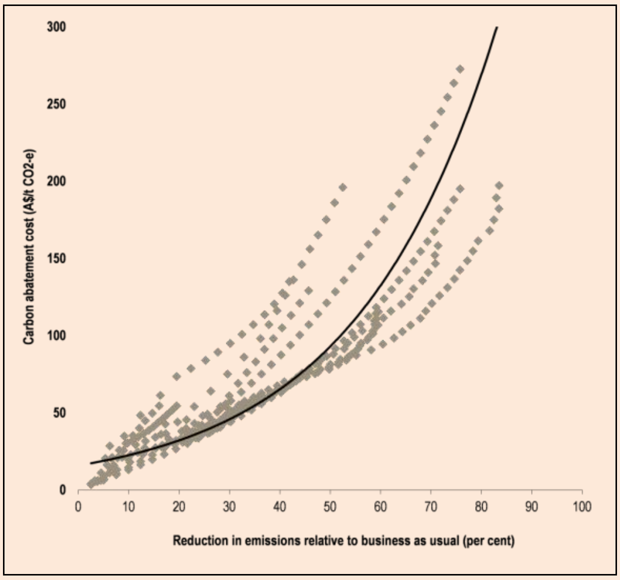
The comparative cost of abatement between countries will ultimately depend on the relative magnitude of these three sets of factors as they each develop over time.

The cost of abatement is itself a function of the extent of abatement to be achieved; generally the cost of abatement is expected to increase as the target increases, potentially at an accelerating rate.

In the context of an international agreement, costs must be understood in a comparative sense. Complex patterns of trade relations (the foundation of modern growth) mean that differences in costs between countries have trade implications and these implications may also run counter to the original objectives of attempts at emissions reductions.

Chart 4 shows the shape of Australia's abatement cost curve derived from a large number of recent modelling studies. The shape of the curve traced out by the different points from the various studies illustrates that abatement costs tend to increase more rapidly as the magnitude of abatement (relative to business as usual) increases. The recent sequence of global and domestic model analyses provided by Australian Treasury provide a very strong indication that the marginal cost of abatement for Australia (at least over the relevant ranges covered by the modelling) is higher than international abatement costs.[9]

Chart 4: Cost of abatement rise sharply with amount of abatement relative to BAU



Note: The fitted solid line is of the form Y = A*EXP(B*Abatement). The coefficient for B is 0.035 with a standard error of 0.001.

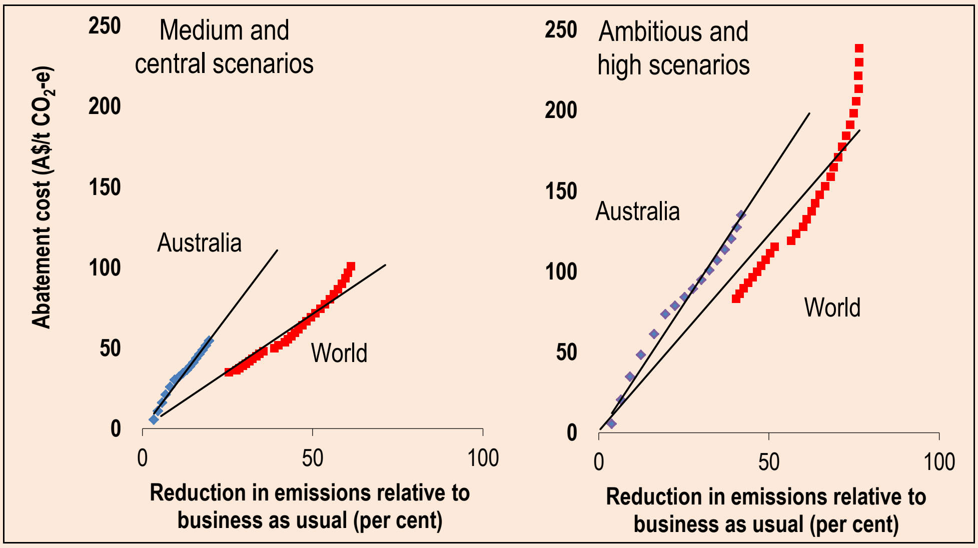
Data source: Modified and updated from Pearce, D 2012 'Empirical uncertainties in climate policy implementation' *The Australian Economic Review*, Vo. 45, No.1. Updated data from *CCMS* and from Jiang et al 2013 *Modelling the trade implications of climate mitigation policy* RIRDC Publication No. 12/104, July. Data modified to cover domestic abatement only.

---

[9] Details of all these studies are available online. They are *Strong Growth, Low Pollution: Modelling a Carbon Price* (referred to as *SGLP*) published in 2011 and available at http://carbonpricemodelling.treasury.gov.au/content/default.asp; *Australia's Low Pollution Future*, or *ALPF* published in 2008 and available at http://lowpollutionfuture.treasury.gov.au/lowpollutionfuture/default.asp; and *Climate Change Mitigation Scenarios* (*CCMS*) published in 2013 and available at http://www.climatechangeauthority.gov.au/targets-and-progress-review.

Chart 5 illustrates one way of looking at the Treasury results. It plots world and Australian abatement (defined as reduction in emissions relative to BAU) against the (marginal) abatement cost. It illustrates that for two sets of simulations (medium versus ambitious abatement scenarios) the Australian abatement cost curve is clearly higher than the world abatement cost curve.

Chart 5: Comparative cost of abatement: Australia versus world



Note: Linear cost lines are: fitted from model data; indicative only; and have been extended beyond the data points for illustration. As the data points illustrate, cost curves are unlikely to be linear over the full range of abatement.
Data source: CIE derivation from *CCMS* charts 2.4, 2.6, 3.1 and 3.6.

3. MINERALS INDUSTRY ISSUES

Australia's minerals industry operates in a global context where investment opportunities exist in other resource-rich countries and where capital, skilled labour and technology are highly mobile. 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 Australia's major trading competitors. Not to do this would damage major trade exposed, emissions-intensive industries, like minerals and energy that account for more than half of Australia's total exports, and would have negative implications for the wider economy as well as for government revenue.

It is also fundamental to note that Australia competes mostly (though not exclusively) with developing nations, who will be under less pressure to commit to ambitious targets. For example:

- Coal markets: Australia competes with Indonesia, South Africa, the United States and Russia, with new competitors emerging in South America and Africa, as well as the largest global producer China
- Iron ore: Australia competes with Brazil, China, Russia and, emerging, Africa
- Aluminium: Australia competes with China, Russia, Canada and, emerging, the Middle East
- Other commodities:
    - Copper: Australia competes with Chile, Peru, China, the United States and Congo
    - Gold: Australia competes with China, Russia and the United States
    - Nickel: Australia competes with Philippines, Russia, Indonesia, Canada and New Caledonia
    - Zinc: Australia competes with China, Peru and the United States.

Across energy intensive commodities, Australia competes with 40 nations, three-quarters of which are developing economies.

The onus is on Australian governments to develop policies – economic, environment and trade – that contribute to improving 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, and be internationally credible, while 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. This economic structure and role in global trade mean the cost of abatement is high.

Mining emissions

Global emissions (all six major greenhouse gases including carbon and methane) come from a variety of sources, underling the need for comprehensive approaches. Mining activity itself is a relatively small percentage. The International Panel on Climate Change's 2014 reports show:

- Electricity and heat account for 25 per cent
- Forestry, farming and land use account for 24 per cent
- Industry accounts for 21 per cent
- Transport accounts for 14 per cent
- Other energy accounts for 9.6 per cent

- Buildings account for 6.4 per cent.[10]

Out of the total global energy emissions, coal emissions (CO_2-e) account for 18 per cent. Coal for other uses – steel and cement in particular – are another 8.2 per cent.

In Australia mining (not including oil and gas) emissions were 45 Mt in 2013, or 8 per cent of emissions. The largest component is fugitive emissions from coal mining at 30 Mt CO_2-e or 5 per cent of Australia's total emissions.

Australia's mineral sector has contributed to the steady improvement in emissions intensity. In 2011, emissions from aluminium smelting fell by 41.4 per cent compared with 1990, whilst production increased 58 per cent.[11] While coal production has increased by 112 per cent since 1990, fugitive emissions from coal production have increased by only 44 per cent over the same period.[12]

Despite the improvements in emissions intensity, the minerals sector future performance will be largely dependent on highly variable geological, operational and geographical factors.[13] Many of these are a product of geology and out of the operator's control.

In particular the minerals sector faces four related realities namely:

- First, as the quality and accessibility of ore grades decline, more capital, labour and energy are needed to extract them.
    - In particular, the declining quality of ore grades means that the CO_2 emissions generated in the production of the same ounce, kilogram or tonne of output may **increase** even when an operation is pursuing leading practice extraction methods.
- Second, as operations mature, mines become deeper, the horizontal and vertical transport requirements increase and the ratio of waste rock to ore increases.
    - Not surprisingly, with any individual mine, operators seek the highest value opportunities first. Future mines will have more acute emissions drivers than those in operation now.
    - Accordingly, emissions may increase even with the adoption of leading practices and innovative technologies.
- Third, mines will increasingly be located in more remote locations, which generally require reliance on oil fuels, particularly in the early stages of development.
- Fourth, in the coal sector, the variability of methane emissions (known as fugitive emissions) in similar seams can be considerable, extremely difficult to predict and the options open to mitigate these emissions can be extremely limited.
    - Fugitive emissions can even vary between different parts of a single mining complex.

As a result of the above factors, previous emissions and energy data are not a reliable guide to future trends in the minerals sector. Measures based on historical emissions could represent a substantial disadvantage to producers confronting lower quality and deeper ore grades and/or for coal highly variable fugitive emissions.

[10] International Panel on Climate Change, *Synthesis report*, 2014, p 47; IPCC Working Group III report, pp 749,758
[11] Australian Aluminium Council, "Aluminium smelting greenhouse performance, 2010.
[12] ABARES AND Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education, "Australia's national greenhouse accounts", April 2013.
[13] This was recognised in Treasury modelling under the previous Government which forecast a 12 per cent rise in coal mining emissions in the decade to 2020. See analysis by the Centre for International Economics in the *Minerals Council of Australia Submission to The Green Paper for the Emissions Reduction Fund*, February 2014.

4. MARKET MECHANISMS AND TRADE EXPOSURE

The minerals industry has supported market mechanisms (which might include emissions trading) provided that they are:

- Internationally calibrated
- Comprehensive in coverage
- Give protection for trade exposed and/or emissions intensive operations
- Not a revenue raising vehicle (while accepting adequate compensation for the disadvantaged).

There is a variety of different approaches around the world, each with different design features:

- The North American sulphur dioxide Clean Air Act baseline and credit trading scheme
- The Alberta baseline and credit scheme
- The EU ETS which has a 27 year implementation timetable and significant trade exposed industry provisions
- The Korean scheme with effective carving out of exports.
- The Emissions Reduction Fund/Safeguard Mechanism model, an abatement purchasing market mechanism.

All schemes recognise:

- The need to phase in gradually (to provide a long term price signal while allowing industry to adjust)
- Specific protection of trade exposed industries.

The World Bank examined 39 nations' schemes in 2015 including the Chinese regional pilot schemes. It concluded that while the nations and regions accounted for 25 per cent of global emissions, the schemes covered only 12 per cent of actual emissions.[14]

Under Phase Three of the EU ETS which commenced in 2013, only 45 per cent of emissions are covered, allocated sectors receive 80 per cent allocation moving down to 30 per cent by 2020. Methane is not included in the ETS (although it is part of the EU greenhouse inventory).

The European Union has a trade exposure as well as an emissions intensity test (see Box 3). From 2013 the EU ETS offered 100 per cent allocation to 151 sectors. (Individual nations can and have offered additional allocation to other sectors). By comparison the former Australian scheme offered partial allocation to only 43 'activities' in 25 sectors.

The Australian experience is now a mix of policies and market mechanism. In future, the minerals industry would prefer an evolution rather than wholesale disruption which provides certainty for investment and greater confidence in environmental outcomes.

[14] World Bank, *State and Trends of Carbon Pricing*, Washington, 2014, pp 51-52.

Box 3: EU trade exposure test

According to the ETS Directive (Article 10a), a sector or sub-sector is deemed to be exposed to a significant risk of carbon leakage if:

- The extent to which the sum of direct and indirect additional costs induced by the implementation of the directive would lead to an increase of production cost, calculated as a proportion of the Gross Value Added, of at least 5 per cent **and**
- The trade intensity (imports and exports) of the sector with countries outside the EU is above 10 per cent.

A sector or sub-sector is also deemed to be exposed to a significant risk of carbon leakage if:

- The sum of direct and indirect additional costs is at least 30 per cent **or**
- The non-EU trade intensity is above 30 per cent.[15]

It has long been understood that, in practice, the administrative allocation of permits to trade exposed and/or emissions intensive industries will not remove the incentive to reduce their emissions and that it is possible that the mere existence of a carbon price puts pressure on industry to invest in efforts to reduce emissions.[16] Under a global emissions trading scheme, consideration of trade exposed and/or emissions intensive status would not be necessary. When developing a domestic emissions trading scheme **ahead** of global action, trade exposed and/or emissions intensive status is an indispensable element of such a scheme. It is not a special favour. It is an essential component in ensuring the key objectives of such a scheme – environmental effectiveness and economic efficiency – are met. A scheme that reduces the competitiveness of Australian firms, leads to their closure or relocation abroad and/or the expansion of production in other locations, or renders Australia uncompetitive to new investment in particular sectors is neither economically efficient nor environmentally effective.

Administrative allocation to trade exposed and/or emissions intensive firms will not dull the incentive to reduce their emissions. As a staff paper from the [US] National Commission on Energy Policy correctly stated:

> A firm that receives free allowances has exactly the same incentive to reduce emissions as a firm that receives no free allowances. Using an allowance, regardless how it was acquired, means giving up something of value (since the firm could otherwise sell the unused allowance in the market place).[17]

The key test of a firm's trade exposed and/or emissions intensive status is not a simple function of their emissions or fossil fuel throughput. Rather it is a function of the ability to pass through costs and other factors.

The ability to pass through costs is determined in large part by whether (or not) the firm or sector is a price taker on international markets. As noted above, the other key factor is whether major competitors in key sectors are also subject to a comparable carbon price signal.

---

[15] http://ec.europa.eu/clima/policies/ets/cap/leakage/index_en.htm
[16] I. Jeguo, L. Rubini, *The Allocation of Emission Allowances Free of Charge: Legal and Economic Considerations*, ICTSD Programme on Competitiveness and Sustainable Development, August 2011.
[17] National Commission on Energy Policy, 'Allocating Allowances in a Greenhouse Gas Trading System', *NCEP Staff Paper*, 2006

5. TECHNOLOGY FOCUS

Climate change is a multi-faceted challenge and technology must form part of the solution. Future policy should be framed with a focus on research, development and deployment.

The coal sector has recognised this with the creation of its Coal21 Fund, and the ACARP research project, both supported by company levies. Companies invest significantly in research and development or by seed funding in first-of-a-kind projects.

The government's Direct Action policy with its focus on incentives for abatement under the Emissions Reduction Fund is consistent with this approach. In the future there may be scope for new initiatives, such as requirements for ultra-supercritical (high efficiency, low emissions) coal-fired generation or nuclear power.

Low emissions coal

Substantial progress is being made reducing the carbon footprint of coal-fired power generation. High efficiency, low emission (HELE) technologies allow power generators to operate at higher temperatures and greater pressure, reducing emissions generated per watt of electricity by up to 40 per cent.[18] New technologies under testing promise to reduce these emissions even further.[19] HELE coal-fired power stations integrated with carbon capture and storage (CCS) can reduce CO_2 emissions by around 90 per cent.[20]

The roadmap to a low emissions coal future is increasingly clear – increase the efficiency of coal use and capture greenhouse gas emissions through the utilisation cycle. This means:

- High efficiency, low emissions (HELE) coal-fired generation technologies should be deployed. They can achieve significant CO_2 emission reductions of 20 to 25 per cent compared with the average of the existing world coal fleet and up to 40 per cent reductions compared to the oldest technology in place
- In parallel, develop CCS technologies so they can subsequently be integrated into HELE-enabled industrial plants, and reduce fugitive emissions from coal production.

The key to addressing global emissions ultimately lies in the uptake of HELE and CCS low emissions technologies by both developed and developing countries.

In the IEA's core new policy scenario, almost two coal plants are added for each one that is retired, bringing the global installed capacity in 2040 to 2,468 GW – an increase of more than 25 per cent over today's level.[21] Almost three-quarters (72 per cent) of new global coal-fired capacity employs HELE technology. The share of HELE plants (including those fitted with CCS) rises from 33 per cent of world coal-fired capacity (670 GW) to 58 per cent (1,424 GW).[22]

Over the period to 2040, China continues to lead in deploying HELE coal plants, accounting for around 60 per cent of the global additions from 2014 to 2040. India achieves one of the highest

---

[18] ACA Low Emissions Technologies assessment based on publicly available information on world power plant efficiency levels, July 2015. According to a discussion paper released by the former Gillard Government, new coal technologies can increase the efficiency of Australian plants to over 45 per cent and lower their CO_2 emissions by up to 50 per cent. See the Department of Industry, Innovation and Science, *A Cleaner Future For Power Stations,* Interdepartmental Task Group Discussion Paper, 1 November 2010, p. 5.

[19] International Energy Agency, *Technology Roadmap High-Efficiency, Low-Emissions Coal-Fired Power Generation*, Paris, originally published in 2012, updated March 2013, p. 19; Shoichi Itoh, *A New Era of Coal: The 'Black Diamond' Revisited,* National Bureau of Asian Research, working paper commissioned for the 2014 Pacific Energy Forum, Seattle, 23-24 April 2014, p. 7.

[20] International Energy Agency, *Technology Roadmap High-Efficiency, Low-Emissions Coal-Fired Power Generation*, Paris, originally published in 2012, updated March 2013, p. 19.

[21] Note: The IEA uses three policies scenario: current policies, the New Policies Scenario and a 450 degree scenario. NPS is important as it lines up with emissions reduction offers in Paris – it reflects actual commitments. The 450 Scenario is NOT a detailed forecast: it simply divides up possible shares of energy fuels assuming the target has been reached, it does not attempt to reconcile economic and trade growth patterns as occurs with the other two scenarios.

[22] International Energy Agency, *World Energy Outlook 2015,* Paris, released on 10 November 2015, p. 330f.

increases in average fleet efficiency over the period – by 4.5 percentage points – to reach the level of the OECD and China today. South-East Asian countries also begin to invest in HELE plant.[23]

The rapid adoption of HELE technologies raises the global average efficiency of coal-fired plants, saving 265 million tonnes of oil equivalent of coal in 2040, the same amount as the European Union's current coal consumption. Increasing coal efficiency also reduces global CO_2 emissions by 1.9 Gt in 2040, the equivalent of India's current emissions.[24]

To help stimulate the investment necessary for the sustainable deployment of HELE and CCS technologies in our region, policymakers should:

- Adopt technology-neutral policies to ensure there is no bias against any fuel option for domestic electricity generation
- Encourage a suite of options including fossil fuels, renewables and combinations of both
- Continue to support CCS demonstration projects and underpinning research to reduce costs
- Adopt neutral policies regarding both Australia's foreign aid and export finance insurance arrangements for investment in generation technologies in developing countries in our region.

Benefits of uranium / nuclear technologies in lowering emissions

Australia's rich uranium resources provide an opportunity for Australia to make a contribution to lower its own emissions and those of other countries.

Nuclear power is a dependable base-load electricity provider which is competitive with other sources of generation. Around the world, planning and construction activity is strong. According to the World Nuclear Association, there are currently 71 reactors under construction in 14 countries, including 27 in China, 10 in Russia and six in India. Two of the 14 countries are building their first ever reactors and will soon join the 30 countries that already have nuclear power generation industries.

In addition, there are 174 reactors planned in 26 countries, and a further 301 reactors proposed in 35 countries.[25]

Further expansion of nuclear capacity is expected, bringing with it further increases in uranium demand. The IEA notes that while more than 80 per cent of current nuclear capacity is in OECD countries, non-OECD countries will account for the bulk of future growth. Of the capacity presently under construction, about 80 per cent is in non-OECD countries.

In the IEA's core new policy scenario global nuclear generation grows by 89 per cent from 2012 to 2040, its share of total generation increasing by one percentage point to 12 per cent. Growth in generation is underpinned by a corresponding expansion of capacity, which rises by 58 per cent.[26]

The Australian Government should remove the ban on nuclear power as a first step in opening up the debate about the option of nuclear power in Australia. It is well recognised that developing a nuclear power sector would take a decade or more. Plants themselves take several years to build. Establishing a regulatory regime, construction and operating capability would also take several years and would need to be in place before construction of plants would even be considered.

If the government considers that the deployment of a civilian nuclear power program could be an option in future, then policy should set the framework to enable the consideration of the issue.

---

[23] International Energy Agency, World Energy Outlook 2015, Paris, released on 10 November 2015, pp. 332, 334.
[24] International Energy Agency, World Energy Outlook 2015, Paris, released on 10 November 2015, pp. 86f, 334f.
[25] *http://www.world-nuclear.org/info/Facts-and-Figures/World-Nuclear-Power-Reactors-and-Uranium-Requirements/*
[26] International Energy Agency, *World Energy Outlook 2014*, Paris, 2014, p 409.