

# Investing in Australia during climate change

Treasury's October 2008 report on the economics of climate change mitigation was followed in December by the Government's White Paper on its carbon pollution reduction scheme. What guidance do these comprehensive reports, and other emerging data, provide to investors in climate-affected industries such as agriculture and tourism, which are now facing large long-term risks?



RICHARD CUMPSTON is a director of JR Cumpston Pty Ltd, consulting actuaries. As a PhD student at ANU, he is constructing microsimulation models of Australian households. He owns shares in Geodynamics Limited. Email: richard.cumpston@gmail.com



RICHARD DENNISS is Executive Director at the Australia Institute, and an Associate Professor at the Crawford School of Economics and Government at the ANU. He has published extensively on the economics of climate change. Email: richard.denniss@anu.edu.au

**ALTHOUGH THE GOVERNMENT** accepts the need for a global target level of 450 parts per million (ppm) of CO<sub>2</sub>, its 2020 emissions target range is set at a 510 to 550 ppm global target range. International condemnation, or rapid climate change, may make Australia's position untenable.

Emissions from electricity generation in 2020 are projected to be 102% of 2010 levels under the CPRS-15 scenario. Achieving an overall 15% reduction below 2000 levels by 2020 is likely to require heavy use of international abatement.

As a result of the 20% renewable energy target, electricity generation from wind is projected to approximately quadruple between 2010 and 2020, and then plateau for a decade.

Reflecting the low projected permit prices, very little electricity is expected from geothermal or solar sources before 2020. No significant carbon capture and storage is likely before 2040.

Extensions to transmission lines, and changes to electricity markets, have been referred to other further inquiries. These are important issues for low-emission sources such as wind, geothermal and solar.

Potential investors in low-emission electricity sources still face high risks and uncertain returns. While owners of coal-fired electricity generators will share about \$3.9 billion worth of permits, rapid increases in permit prices may make some of these generators unviable.

Emission intensive trade exposed (EITE) industries will receive generous assistance, but the five-year notice period for changes to this legislation is much shorter than the lifetimes of new investments. However, investors in climate-affected industries such as agriculture and tourism will face large long-term risks.

The small reductions proposed in Australia's emissions will do little to encourage effective international action.

## Government commitments

### *Pre-election commitments*

In his address on 3 December 2007 to the Bali Conference on Climate Change, the Prime Minister said:

The Government has committed to reducing Australia's greenhouse gas emissions by 60% of 2000 levels by 2050 ...

Australia will implement a comprehensive emissions trading scheme by 2010 to deliver these targets. We will increase the proportion of renewable energy to 20% of our national electricity supply by 2020. We will invest in research and development to deliver transforming technologies.

**Climate change will have complex local effects, and long-term investors in agriculture and tourism will need expert scientific advice. Some of Australia's main attractions for international tourists are at risk, and high air fares are likely to further deter visitors. Cyclones and storm surges may become major threats to coastal areas such as Surfers Paradise.**

### *The December 2008 White Paper*

The White Paper confirmed these commitments and provided details of the Carbon Pollution Reduction Scheme (CPRS) to commence on 1 July 2010. The main proposals are outlined in the Appendix to this paper.

Facilities with direct annual emissions of 25,000 tonnes of CO<sub>2</sub>e or more will need to acquire a permit for every tonne of greenhouse gas they emit. The scheme will cover around 75% of Australia's emissions.

Exports of permits will be banned initially, but there will be unlimited access to international abatement, delivered through the Kyoto Protocol's project-based flexibility mechanisms.

EITE firms, and most coal-fired electricity generators, will receive some free permits as a transitional assistance measure.

## **Australia in a world of 450 ppm**

### *450 ppm CO<sub>2</sub> as the limit before dangerous climate change*

One of Treasury's consultants (Pearman 2008, p. 20) noted that only the 450 ppm scenario gave a reasonable chance of limiting the increase in global average temperature to 2°C – the temperature threshold most frequently viewed in the scientific literature as representing the limit beyond which 'dangerous' climate change may occur.

### *Consequences of 450 ppm CO<sub>2</sub> for Australia*

Pearman (p. 30–31) considers that 450 ppm will see Australian climatic zones moving southwards by about 200 kms by 2100. Natural and agricultural production systems will show little resemblance to current systems. Loss of rainfall across much of the nation, together with higher evaporation rates, will significantly reduce water availability.

Specific ecosystems at greatest risk are the Great Barrier Reef, the southwest of Western Australia, the Murray-Darling Basin, eastern Australian alpine systems,

eastern Queensland, Kakadu, the Queensland wet tropics and the sub-Antarctic islands.

The continued decline in water available to our major cities will require both behavioural change and technical intervention to ensure that reliable supplies are maintained.

Coastal inundation by seawater will affect freshwater aquifers and wetlands in coastal regions. In some areas, combined with the changing frequency of extreme storminess, sea-level rise will mean that some coastal settlements will need to be abandoned or substantially redeveloped.

Very significant impacts on rural communities are likely. Bushfires and extreme storminess will pose a greater threat to built infrastructure in coastal and rural regions.

### *Consequences of 450 ppm for investors in Australia*

Climate change will have complex local effects, and long-term investors in agriculture and tourism will need expert scientific advice. Some of Australia's main attractions for international tourists are at risk, and high air fares are likely to further deter visitors. Cyclones and storm surges may become major threats to coastal areas such as Surfers Paradise. If ice-caps in Greenland and Antarctica melt more quickly than current IPCC projections, sea level rises may threaten low-lying buildings in capital cities.

## **The Government 'believes in' 450 ppm, but is targeting 510 or 550**

### *The Government 'believes in' 450 ppm*

The White Paper indicates that:

The Government believes that it is in Australia's national interest to achieve a comprehensive global agreement to stabilise atmospheric concentrations of greenhouse gases at around 450 parts per million ... (pp. 30–31)

### *The Government's targets assume 510 ppm to 550 ppm*

The White Paper notes that Treasury has modelled five scenarios, including CPRS-5 and CPRS-15.

These include the impact of the Scheme as presented in the Green paper, and achieve reductions by 2020 of 5 per cent and 15 per cent ... below 2000 levels. Both assume a staged approach to international action, with developing countries joining the system from 2015 to 2025 ... CPRS-5 (is located) in a global scenario which would stabilise global atmospheric greenhouse gases at around 550 ppm CO<sub>2</sub>e by the end of the century; and CPRS-15 in a global scenario with stabilisation at around 510 ppm. (pp. 4–11)

### **Present proposals will not meet the Government's 2050 commitment**

Chart 6.4 of the Treasury report suggests that CPRS-5 may reduce Australia's emission to about 420 MtCO<sub>2</sub>e in 2050, while CPRS-15 may reduce them to about 300 MtCO<sub>2</sub>e. These are reductions of about 24% and 46% below the 2000 level of 552 MtCO<sub>2</sub>e, compared with the Government's commitment to a 60% reduction.

### **Any more ambitious targets will only apply after 2020**

The White Paper also indicates:

In the event that a comprehensive global agreement were to emerge involving emission commitments by both developed and developing countries that are consistent with long term stabilisation of atmospheric concentrations of greenhouse gases at 450 ppm CO<sub>2</sub>-e or lower, Australia is prepared to establish its post-2020 targets so as to ensure it plays its full role in achieving the agreed goal. (p. xx)

The Government's reluctance to change its 2020 targets may reflect the rigidities and safeguards for industry which it has added into the White Paper. This inflexibility up to 2020 is, however, likely to be unwelcome to other countries trying to negotiate a common outcome.

### **Slowly changing patterns of electricity generation**

#### **Nuclear power ruled out**

Nuclear power appears to have been ruled out by the Government. In their 11 December 2008 report to Treasury on the impacts of the CPRS on Australia's electricity markets, March McLennan Associates (MMA) did not consider nuclear power.

**The Government has adopted a high-risk position, trying to keep Australia's per capita emissions higher than nearly all other countries. International condemnation, or rapid climate change, may make Australia's position untenable.**

### **Electricity sent out by each type of generator under CPRS-15**

In percentage terms, the biggest growth is wind, biomass, geothermal and solar, but in absolute terms, the largest output increases would appear to be from geothermal and gas.

Apart from liquid fuels, these projections are estimated from MMA 2008b (see graphs on pp. 29–30). They have been balanced against the totals in MMA 2008a (p. 37).

#### **Rapid growth in wind power until 2020**

As a result of the 20% renewable energy target, generation from wind is projected to approximately quadruple between 2010 and 2020, and then plateau for a decade. MMA noted that, 'the amount of installed wind capacity in each region was capped at 25% of that region's peak demand, with the exception of South Australia' (MMA 2008a, p. 21). Expensive grid stabilisation measures will be needed to support significant use of wind power.

TABLE 1: Electricity sent out, TWh

Source	2010	2020	2030	2040	2050
Coal	188	155	152	109	120
Natural gas	41	60	70	76	85
Liquid fuels	3	3	3	3	3
Hydro	15	18	18	18	18
Wind	5	19	20	37	40
Biomass	3	10	12	12	13
Geothermal	0	6	12	52	80
Solar	0	1	3	21	27
<b>Total</b>	<b>255</b>	<b>272</b>	<b>290</b>	<b>328</b>	<b>386</b>

### **Rapid growth in geothermal power after 2030**

MMA project about 12 terawatt hours (TWh, 10<sup>12</sup> watts for an hour) of geothermal power generation will be required in 2030, rising rapidly to 52 TWh in 2040. Geothermal generation is suited for baseload applications, and MMA assume 80% capacity utilisation (2008a, p. 75). At this utilisation, a 1GW station would generate about 7 TWh a year. The assumed 2030 generation is thus the output from about 1.7 gigawatt (GW, 10<sup>9</sup> watts) of geothermal capacity.

The Geodynamics annual report for 2007–08 notes that preliminary testing of its Cooper Basin hot rocks suggests that they contain enough energy to support power development of between 5 and 10 GW (see p. 3). The company is working towards having a 500 MW development operating by the end of 2015 (see p. 50).

### **New fossil fuel plants are gas not coal until 2020**

In all the scenarios modelled, no new coal plants are brought on line in the period to 2020. New gas plants are brought on line even in the reference case. (MMA 2008a, p. 39)

### **Very little carbon capture and storage is likely before 2040**

Under the CPRS-15 scenario, the total amount of greenhouse gases ever captured and stored is only about 40 MtCO<sub>2</sub>-e by 2040, rising to about 1680 Mt by 2050 (MMA 2008a, p. 53). The 40Mt cumulative reduction is negligible compared with the 175 Mt of emissions from electricity generation in 2000 (MMA 2008a, p. 34).

### **Under CPRS-15, emissions from electricity stay high until 2030**

TABLE 2: Emissions from electricity generation (MtCO<sub>2</sub>-e)

Source	2010	2020	2030	2040	2050
Emissions	175	179	181	135	55
As % 2010	100%	102%	103%	77%	31%

If no emission reductions are projected in the electricity sector until after 2030, it is difficult to see how the targeted 15% reduction below 2000 levels (by 2020) can be achieved. Is Treasury assuming substantial volumes of overseas permit purchases?

TABLE 3: Estimated value of profit reductions and assistance (\$m)

Type of Generator	MMA	ACIL Tasman	ROAM Consulting	Average	ESAS assistance
Brown coal	2344	4552	4100	3665	3088
Black coal	-2197	5954	5258	3005	789
<b>Total</b>	<b>147</b>	<b>10506</b>	<b>9358</b>	<b>6670</b>	<b>3877</b>

### **\$3.9 billion of assistance for existing electricity generators**

Estimates of the present value of the profit reductions suffered from 2010 to 2020 (under CRPS-15) by coal-fired generators were made for the Department of Climate Change (MMA 2008c, ACIL Tasman and Roam Consulting – see Table 3). Their estimates for individual generators varied considerably, and MMA projected overall profit gains for black coal generators, rather than the large reductions projected by ACIL Tasman and Roam Consulting (White Paper, p. 13–19). These large estimate variations show how hard it is to make projections of profitability under emissions trading, even for established generators with a 10-year history of participation in the National Electricity Market.

The assistance estimates were made by Innovest, in a report for the Australian Conservation Foundation. The White Paper's use of emissions over 0.86 tonnes of CO<sub>2</sub>e per MWh has resulted in about 80% of the assistance going to eight brown coal stations (six in Victoria, two in South Australia).

### **High levels of assistance for EITE industries**

High levels of assistance are proposed for emissions-intensive trade exposed industries, to be phased out by about 2030.

The Treasury report provides output projections in 2050 for 58 industries (p. 164). Only oil, chemicals, aluminium, other metals manufacturing and coal-fired electricity are projected to be below 2008 outputs. Most other industries are expected to at least double their outputs by 2050, with particularly high growth from forestry, low-emission electricity and all forms of transport.

Strong growth is expected in emissions from some of these industries, as EITE assistance (excluding agriculture) is expected to rise from 25% of permit revenue in 2010 to 35% of much higher permit revenue in 2020.

## Risks for the Government and for investors

### Risks for the Government

Significant changes to the Government's proposals may be needed to get legislation through the Senate. Legal commitments on assistance and caps may be costly to unwind if larger emission reductions prove necessary. Rapid growth in emissions from EITE industries may exhaust permit revenue, and become an added burden on government revenue.

The Government has adopted a high-risk position, trying to keep Australia's per capita emissions higher than nearly all other countries. International condemnation, or rapid climate change, may make Australia's position untenable.

The White Paper expects an initial carbon price of about \$25 a tonne of CO<sub>2</sub>e, and is setting an initial price cap of \$40, rising at 5% p.a. in real terms. If local and international permit prices rise above the cap within the first five years, Australian emitters will pay these capped prices. The Government may have to make costly permit purchases, with any cost over the capped price borne by it.

As a result of the global economic recession, secondary market certified emissions reductions have dropped by two-thirds from their 2008 peak to about A\$20.50 (Breusch 2009). International permit prices are very volatile, and inherently unpredictable.

### Risks for investors

Potential investors in low-emission electricity sources still face high risks and uncertain returns. Transmission lines, sale arrangements and grid stabilisation have been referred to further inquiries. Projected carbon permit prices until at least 2020 are too low to make most low-emission sources viable without capital subsidies or a renewable energy target.

Owners of coal-fired electricity generators will share about \$3.9 billion worth of permits, but unexpected rapid increases in permit prices may make some of these generators unviable.

EITE industries will initially receive 90% or 60% of the carbon permits free, with these rates of assistance declining at 1.3% p.a. The five-year notice period for changes to this legislation is generous, but still much shorter than the lifetimes of new investments.

Investors in climate-affected industries such as agriculture and tourism will face large long-term risks. The small reductions proposed in Australia's emissions will do little to encourage effective international action, and do little for these industries. ☺

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## Glossary

<b>CPRS</b>	carbon pollution reduction scheme
<b>EITE</b>	emissions intensive, trade exposed
<b>GW</b>	gigawatt (10 <sup>9</sup> watts)
<b>MMA</b>	McLennan Magasanik Associates
<b>ppm</b>	parts per million
<b>ESAS</b>	electricity sector adjustment scheme
<b>tCO<sub>2</sub>e</b>	tonne of carbon dioxide equivalent emissions
<b>TWh</b>	terawatt hour (10 <sup>12</sup> watts for an hour)

## Appendix : The December 2008 White Paper

### A1 *The December 2008 White Paper*

- Confirmed the Government's commitment to reducing emissions to 60% below 2000 levels by 2050 (page xx)
- Set a target to reduce emissions by between 5% and 15% below 2000 levels by 2020 (xx)
- Noted its belief that a comprehensive global agreement to stabilise atmospheric concentrations of greenhouse gases at around 450 ppm CO<sub>2</sub>e would be in Australia's interest (xx)
- Indicated its willingness to establish post 2020 targets to ensure Australia plays a full role in achieving such an agreed goal (xx)
- Said that the Government intended to commence the Carbon Pollution Reduction Scheme (CPRS) on 1 July 2010 (xxv).

### A2 *Key elements of the CPRS*

- Facilities with direct emissions of 25,000 tonnes of CO<sub>2</sub>e or more will need to acquire a permit for every tonne of greenhouse gas they emit (liii)
- Certain categories of firms will receive an administrative allocation (i.e. free) of permits, as a transitional assistance measure (xxvi)
- The scheme will cover around 75% of Australia's emissions and involve mandatory obligations for around 1000 entities (xxviii)
- Emissions from stationary energy, transport, fugitive, industrial processes, waste and forestry will be covered (xxviii)
- Agricultural emissions may be covered by 2015 (xxxix) (unlikely due to measurement problems)
- Deforestation will not be covered (xxix)
- The scope for domestic offsets will be considered in 2013 (xxix)
- Permits will be created as personal property, and the scheme legislation will not provide any power to extinguish permits without compensation (xxix)
- Permits will be able to be banked indefinitely, but only 5% of a year's liabilities can be met by borrowing from the next year (xxix)
- Exports of permits banned initially, and only introduced with five years' notice (xxxiii)
- Unlimited access to international abatement, delivered through the Kyoto Protocol's project-based flexibility mechanisms (xxx)
- A five-year cap on the price of permits, starting at \$40 and increasing at 5% p.a. real (xxxi)
- Scheme caps specified at least five years in advance, with up to a further 10 years of guidance provided through the establishment of gateways (xxxii)
- All the revenue raised from the scheme will be used to help households and businesses adjust, and to invest in clean energy options (xxxiii)

- Motorists will be protected from higher fuel costs from the scheme by cent-for-cent reductions in fuel tax for the first three years (xviii)
- The rolling balance method will be used for tax purposes, with taxpayers able to elect to use historical cost or market values (lxxxiii)
- Carbon pollution permits and eligible Kyoto units will be personal property rights for GST purposes, and normal GST rules will apply to scheme transactions (lxxxiv).

### A3 *Assistance to emissions-intensive, trade exposed (EITE) industries*

- Trade exposure will be defined as having a trade share greater than 10% in any year between 2004–05 and 2007–08, or a demonstrated lack of capacity to pass through costs due to international competition (xxxiv)
- 90% initial assistance (i.e. free permits) for activities with at least 2000 tCO<sub>2</sub>e per \$m of revenue, or at least 6000 tCO<sub>2</sub> per \$m of value added (lxxv)
- 60% free permits for activities with at least 1000 tCO<sub>2</sub>e per \$m of revenue, or at least 3000 tCO<sub>2</sub> per \$m of value added (lxxvi)
- Emissions per unit of production based on 2006–07 and 2007–08 (lxxv)
- Revenue or value added based on 1/7/04 to 31/12/08 (lxxv)
- The rate of assistance will decline at 1.3% pa (xxxv)
- Five years notice will be provided of any modifications to the EITE assistance program, unless the modifications are required for compliance with Australia's international trade obligations (lxxix)
- Allocations to the EITE sector are expected to be around of 25% of total permits initially (rising to 35% with the inclusion of agriculture), and increasing to around 45% by 2020 (xxxvii)
- Allocated permits will be valued at zero for tax purposes at the end of an income year ending before the last surrender date for the emissions year for which they were issued (lxxxiii).

### A4 *Assistance to coal-fired electricity generators*

- Coal-fired electricity generation is the only strongly affected industry, and the Government will consider assistance measures for that industry (lxxx)
- The Government will issue up to 130.7m permits over the first five years of the scheme, subject to the outcome of a windfall gains review (lxxxi)
- Assistance permits will be shared between eligible generators in proportion to their energy output in the three years to 30 June 2007, weighted by their excess emissions over a threshold of 0.86 tonnes of CO<sub>2</sub>e per MWh (13–30)
- The value of permits on hand at the end of their year of issue will be included in assessable income for the year (lxxxiii).