CHAPTER 9
AVOIDING DANGEROUS CLIMATE CHANGE

Around 250 years ago, the onset of modern economic development added a new component to climate change on Earth: human activity leading to the partial return to the atmosphere of carbon that had been sequestered in living things and in the Earth's crust through natural processes. The clearing of forests and woodlands for agriculture and, above all, the combustion of fossil carbon began to raise the atmospheric proportion of carbon dioxide and other greenhouse gases. These processes became larger and faster after World War II, and again in the Platinum Age of the early twenty-first century.

While modern physics recognised in theory the warming effect of carbon dioxide and other 'greenhouse gases' from the late nineteenth century, only since the 1980s have scientists understood the empirical relationships between ongoing economic growth and warming

well enough to be confident about suggesting strong action. By the early 1990s, there was international agreement on the need to reduce the dangers of human-induced climate change. It was then widely thought that most of the world's greenhouse gas emissions would continue to be generated in the old industrial countries for a considerable period. There would be time later for developed countries to take early action and for the developing countries to join the mitigation effort.

But the same Chinese economic growth that gave Australia its resources boom also accelerated the increase in atmospheric greenhouse gases. In the early twenty-first century, the Chinese, Indian and Indonesian economies were growing strongly – they were the world's most populous developing countries. All three were at stages of development in which economic growth was particularly energy-intensive. And for all of them, coal was a relatively low-cost source of energy, if environmental problems were ignored. Unless action was taken to break the link between economic growth and emissions, China would account for 41 per cent of global emissions in 2030, and India for 11 per cent. Major interventions were required.

A SUCCESSFUL APPROACH TO MITIGATION

Early international meetings sought binding agreements to reduce carbon emissions. The Copenhagen meeting in

December 2009 showed that there would be no early comprehensive and binding agreement. The development of an alternative was led by President Barack Obama and the heads of government of four large developing countries: China, India, Brazil and South Africa. I call the new approach, which was formally adopted at Cancún in December 2010, 'concerted unilateral mitigation'.

For the time being, each country specifies unilaterally and voluntarily its emissions targets – developed countries as absolute reductions and developing countries as reductions in emissions intensity or against business as usual. These can be calibrated by each country's assessment of the progress of others. They are serious domestic commitments communicated to the international community. In 2015, a Paris conference will seek a comprehensive binding agreement, to come into effect in 2020.

But whatever the outcome in Paris, it is now clear that concerted unilateral mitigation can take us a considerable way. The domestic targets at Cancún represented large reductions from business as usual for the developed and major developing countries alike. The European Union and Japan – already with emissions per person much less than half those in Australia, the United States and Canada – all made commitments to go much lower. The European Union unconditionally committed to cutting emissions by 20 per cent on 1990 levels by 2020, and by 30 per cent if others made commensurate efforts. Japan undertook to reduce emissions by 25 per cent on 1990 levels.

The world's two largest emitters of greenhouse gases, China and the United States, had previously declined to make commitments, but in 2009 they both announced major departures from their established trajectories. These were presented formally to the United Nations in 2010.

China said that it would reduce the emissions intensity of its economic activity by 40–45 per cent between 2005 and 2020, at the same time as implementing an unprecedentedly large programme of reforestation. The United States announced that it would reduce emissions by 17 per cent on 2005 levels by 2020.

The commitments under concerted unilateral mitigation were probably more ambitious than they would have been in a notionally legally binding agreement negotiated by all countries. Formal negotiations make country representatives defensive. This explains the paradox of trade negotiations: formal negotiations to reduce trade barriers often lead to less trade liberalisation than unilateral decisions in a national frame.

So far almost all substantial countries are making strong progress on their undertakings. The European Union has introduced many simultaneous measures: renewable energy targets; feed-in tariffs for various forms of renewable energy; fiscal subsidies, including for carbon capture and storage and nuclear developments; carbon taxes; and an EU-wide Emissions Trading Scheme (ETS). Permit prices under the ETS have ranged from well above $A40 to as low as $A5 (they were $A7.72 on 19

September 2013). Low recent prices reflect weak domestic growth, which means that the other interventions can deliver the required reduction in emissions without much help from the ETS. Higher prices would return with stronger economic growth or tighter targets. They would cause the trading scheme to take more of the mitigation load, and at some price make each of the detailed interventions redundant.

Japan was making good progress towards its target before the Fukushima disaster reduced the role of nuclear power, but has become less confident of meeting its target since then.

MUSCULAR DIRECT ACTION IN THE UNITED STATES

President George W. Bush said in 2007 that US emissions would reach a peak in 2025 and then fall. We now know that US emissions peaked in the year in which Bush was speaking and President Obama's 2020 target is within reach.

When Obama revealed the 17 per cent cut in 2009, he had intended that an ETS would be the main instrument for cutting emissions. A bill for such a scheme passed the House of Representatives in 2010, but a vote in the Senate was avoided by filibuster. The Congress after the 2010 elections would not support carbon-pricing legislation.

In a personal conversation early in 2011, the US secretary for energy, Stephen Chu, advised me that while

the government would have liked to have met its international commitments in an efficient and low-cost manner through an ETS, it would now meet its targets through other means. He described how an inter-agency process had estimated the social cost of carbon at a bit over $US20 per tonne, rising over time. This price would guide the development of regulations for reducing emissions from all of the main sources, including electricity generation, transport, appliances and buildings. In a major speech on climate change in mid-2013, President Obama brought together the outcomes of far-reaching developments in regulation and other steps to reduce emissions.

Many measures have contributed to cutting US emissions: state and federal environmental regulations and energy-efficiency schemes; harassment of the coal and some other fossil fuel industries by non-government agencies; state and federal support for renewable and nuclear energy; regulatory requirements for use of renewable energy; and emissions trading schemes in some states. This is muscular direct action. The largest of the emissions trading schemes – in California and some other western states, and linked to the Canadian province of Quebec – came into operation in January 2013. The federal government will not regulate emissions as severely in states that have effective emissions trading schemes.

Over the past several years, emissions reduction in power generation in the United States has been

reinforced by low natural gas prices. Gas prices have fallen dramatically, driven by the combination of large new reserves and restrictions on exports. While it has been accepted for some time that there would be no substantial new coal-based electricity generators in the United States – and the president's policy outlaws them without carbon capture and storage – the low gas prices are driving the closure of much established capacity.

The big falls in US gas prices are in contrast to the Australian experience, although our east coast has had proportionately much larger increases in gas resources than the United States. As discussed in Chapter 6, our trade policies have made all the difference. Australia has allowed free exports, and gas prices are in the process of increasing by two or three times, up to export parity prices. Some Australian interests favour a partial version of the US restriction on exports, among other things to assist gas in competition with coal for environmental reasons. Viewed as a means of bringing down emissions (by replacing coal), restrictions on gas exports would be extremely expensive, as they have been in the United States.

The US experience shows that regulatory action can bring emissions down a long way. It also shows that to do this, direct action must be muscular and intrusive, and expensive.

CHINA'S RAPID PROGRESS

China, too, is seeing many regulatory and fiscal interventions. Smaller and environmentally and economically inefficient coal-based electricity generators have been forced to close, replaced by super-hypercritical plants operating at the world frontier of low-emissions intensity. So too have environmentally inefficient metals smelting and other industrial plants. Renewables and nuclear power have been favoured by subsidies, high feed-in tariffs and regulatory purchase requirements. There has been high investment to make the national electricity grid more flexible in absorbing large quantities of inflexible (nuclear) and intermittent (wind and solar) sources of power. There is much money for research, development and the commercialisation of low-emissions technologies. Trials of emissions trading are being conducted in seven cities and two provinces as steps towards a national scheme if things go well. Large regulatory pressure and fiscal subsidies are driving increased efficiency in energy use for households and business.

In August 2013, the Chinese government made renewable energy and energy efficiency the main focus of fiscal expansion, when the economic growth rate was threatening to fall below the 7 per cent established as the desirable lower limit. The increased spending in the 2013 stimulus package exceeds half the total budget expansion in response to the Great Crash of 2008. China now is investing more than any other country in all of the

low-emissions sources of electricity: hydro-electric, wind, nuclear, solar, bio-mass. It expects to succeed Germany as the world's largest producer of solar energy over the next year. China is also the centre of the largest research and development drive on carbon capture and storage. It is making an immense effort to increase the efficiency with which energy is used.

China is also seeking to reduce emissions from transport. It is doing two big things. The Chinese government has given electrified intra-urban and intercity rail high priority in planning. This has survived the general downgrading in priority of infrastructure investment since 2011. And China has promoted the fully electric car through consumer and producer subsidies, and has announced a target of having 5 million vehicles on the road by 2020. This is likely to provide large scale and low costs in electric-car manufacturing earlier than in other countries. The fuel efficiency standards for conventional automobiles are being revised in line with emerging norms in advanced developed countries.

After annual growth near double digits for a decade, electricity generation increased by only 5.7 per cent (well below the GDP growth rate) in 2012. Almost the whole of the increase was contributed by hydro-electric, wind and nuclear, in that order, with solar growing even more rapidly from a much smaller basis. Emissions from the electricity sector declined a bit in 2012. This tendency seems to have continued: total coal use in China

(domestic production plus imports) was a bit over 3 per cent lower in the first half of 2013 than in the corresponding period of 2012.

LARGE REDUCTIONS BUT A LONG WAY TO GO

Developed and major developing countries generally have been making good progress towards their domestic Cancún commitments at lower costs than had been anticipated.

It is not possible to convert such commitments into a precise assessment of likely implications for global temperatures, as we do not know what is going to happen next. Despite recent progress, a marked acceleration is necessary to avoid risks of warming of 4 degrees or more. However, Chinese and global progress in lowering the growth path of emissions has kept open the possibility of meeting the 2 degrees objective.

If that is to occur, global emissions need to fall by more than half by the middle of the century, to an average of no more than 2 tonnes per person, and to keep falling after that. This has to occur in a world with expectations in many developing countries, containing most of the world's people, that their standards of living will keep rising towards those in the world's developed countries. The arithmetic says that developed countries on average will have to reduce emissions absolutely by more than 90 per cent. That means close to zero

emissions for electricity generation and transport, and large reductions elsewhere.

AUSTRALIA BENEFITS BY DOING ITS FAIR SHARE

Australia would suffer more than other developed countries by a failure of climate change mitigation. It is in Australia's national interest for the world to succeed. It is in Australia's interest to encourage international efforts by doing our fair share.

If the world has to reduce emissions by more than half by the middle of the century, and developed countries by over 90 per cent, what is Australia's fair share? The international community has decided that what matters is reducing actual emissions, whatever the cost and whatever the motive.

It is immensely to Australia's advantage that the United Nations has decided to calculate actual emissions for each country with reference to tradeable entitlements rather than emissions within a country's boundaries. Australia's economic structure leads to relatively large emissions per person, so it is advantageous for us to buy entitlements from places that are able to reduce emissions at a lower cost.

So what is Australia's fair share? The Climate Change Authority has been established to provide independent and transparent advice on this matter. It takes account of what others are doing. It insulates the development of

advice on emissions targets from the raw political process. Over time it could take its place as an important independent element of our system of economic governance, alongside the Reserve Bank and the Productivity Commission. The new Coalition government would find the work of such an authority helpful.

My own recommendation in the 2008 Climate Change Review had unconditional and conditional elements. I said that Australia should reduce emissions unconditionally by 5 per cent on 2000 levels by 2020. This is what we would do in the absence of other countries taking action to reduce emissions. We should be prepared to go further, up to a 25 per cent reduction, in the event of effective international action. The Labor government, with the support of the Opposition, adopted these targets. The unconditional and conditional targets were reaffirmed during the 2013 election campaign by the Coalition. In 2010, the conditional Australian commitments to the United Nations were given precise form. Our emissions would be reduced by 15 per cent if other developed countries took on comparable commitments and major developing countries committed to substantially restraining emissions. They would be reduced by 25 per cent in the context of a comprehensive global agreement capable of meeting the 2 degrees objective.

Other countries' efforts already would seem to trigger Australia's commitment to a 15 per cent reduction. This is similar to the commitment that the United States has

made and towards which it is making solid progress. The comparison is relevant, since the US also has high energy use per person, high fossil fuel use and strong population growth through immigration. To meet Australia's bipartisan policy communicated to the United Nations, we will need to go further still if a new and deeper set of commitments is made by others at Paris in 2015.

Chapter 6 notes that Australia's economy has already been affected by climate change. Climate change-induced falls in productivity were experienced in utilities and agriculture. It can be expected to be increasingly important in the future, even with effective global mitigation and good fortune in holding temperature increases to 2 degrees. It will be overwhelmingly important if the international effort has incomplete success and future Australians have to live with temperature increases of more than 2 degrees. Adaptation is a useful if expensive accompaniment to prevention but not an alternative to it: it is fanciful to think of nation-states in their current form surviving temperature increases of 4 degrees or more. The costs of climate change and adaptation are part of our current economic reality and will grow at an uncomfortable pace in the decades ahead.

WHICH APPROACH IS CHEAPER?

While the former Labor and the current Coalition governments concur on targets, their approaches to meeting

them are radically different. How we get there is not important to the climate outcome, but it does have implications for productivity and the budget.

Modelling in the 2008 Climate Change Review and subsequently by the Treasury suggests that Australia doing its fair share in a global effort to hold the temperature increase to 2 degrees would shave about one-tenth of a percentage point from growth each year until 2050. However, within about half a century the gains from avoided climate change – the gains from Australia doing its fair share of the global effort – would exceed the costs of mitigation. These gains over losses would grow larger and larger over time.

Part of the cost of global mitigation to Australian incomes comes from export prices falling as other countries do their fair share. The collapse of growth in China's burning of coal for power in 2011 has already contributed to much lower thermal coal prices. The costs to Australia of the Chinese (and American) movement away from coal-based electricity is much greater than it needed to be because we kept investing in new capacity when the writing was on the wall. Billions of dollars of investment has been written down and written off since the market changed after 2011.

Experience in many countries shows that cutting emissions is getting cheaper and proceeding more rapidly than once anticipated. The cost of solar photovoltaic panels made in China in at least one major plant that I

have inspected twice has fallen by 90 per cent over the past five years.

Like Europe, the United States and China, Australia has large numbers of minor policies that have contributed something to cutting emissions, but these are largely overshadowed by the Renewable Energy Target established in 2010, and the Clean Energy package with a national ETS as its centrepiece in 2011.

The Renewable Energy Target requires an increasing proportion of electricity to come from large-scale renewable projects, rising to an amount, fixed by legislation, that was estimated to be 20 per cent by 2020. Unexpected falls in electricity demand make it likely that renewables will fulfil more than a quarter of total requirements by 2020. The combination of the Renewable Energy Target and greater efficiency in electricity use is leading to substantially more rapid decarbonisation of electricity generation than I contemplated in the 2008 Review. It is also leading to lower wholesale power prices as renewable energy competes with established coal-based electricity for a declining market. This is an unanticipated but large benefit for consumers of electricity.

The ETS that came into effect in July 2012 requires all large-scale emitters of greenhouse gases to surrender a permit for each tonne of carbon dioxide-equivalent released into the atmosphere. Permits are made available at a fixed price through the first three years. From July 2015 they will be sold by auction or can be purchased

from participants in the European emissions trading system.

The Australian scheme raises substantial revenue. About half is returned to households as tax cuts and social security increases, and the remainder paid as compensation to business (falling over time) and support for development of renewable energy.

After being on a strongly increasing trajectory for many years, Australian emissions have stabilised under the new policies. Emissions from the electricity sector fell by more than 7 per cent over the year to June 2013. The scheme has made enterprises much more aware of emissions and opportunities for reducing them. This has been especially important in containing what is in any case rapid growth in 'fugitive emissions' associated with coal mining and gas production and processing. Care is taken now to use technologies that involve lower emissions because high emissions could become costly at a later time.

Current policies can meet the more and more demanding reductions that Australia is likely to be called to make, at a relatively low cost and with minimal political discretion and business uncertainty. For a considerable time, the current arrangements are likely to be an economically efficient, large and increasing source of revenue as compensation payments to coal-based generators cease in 2014–15, as compensation to trade-exposed industries is reviewed by the Productivity Commission

from 2015, and as international carbon prices rise with economic recovery in the European Union and the tightening of targets in Europe, Australia and beyond.

The Coalition government came to power in 2013 committed to removing the carbon price. It would seek to meet the established targets by Direct Action, to which it has allocated a sum of money and says there will be no more.

I have no reason to doubt the sincerity of the prime minister and his environment minister in telling the Australian people before the election that the nation's emissions targets would be met under a Coalition government. The environment minister explicitly embraced the conditional as well as the unconditional targets. Since taking office, he has noted that strong progress on emissions is being made in the United States and especially China.

Direct Action, in principle, allows Australia to meet the commitments to the United Nations that were made by the government with the then Opposition's support. However, on the evidence currently available, it is hard to see how the amount of money allocated to Direct Action would be anywhere near enough for us to meet the unconditional target. Using Direct Action to meet a 15 or 25 per cent reduction from 2000 levels by 2020 would be much more difficult still. As the United States and China have shown, it is possible to make radical changes in emissions trajectories without carbon pricing. As the United States and China have also shown, large emissions

reductions through Direct Action require expensive muscular interventions of a kind not yet discussed by the Coalition. Of course, the government can change the content of Direct Action to meet the 2020 commitments, but it would be more expensive to concentrate cuts into a short period than to achieve them gradually.

Australia's trade-exposed and emissions-intensive industries are thoroughly protected under the current arrangements. To comprehensively replace these arrangements with other measures generating similar emissions reductions would not increase incentives for economic activity and may reduce them.

Coal mining is less protected than other trade-exposed industries under current policies, with the average cost of purchasing permits at about 50 cents per tonne in 2013 after deducting assistance from the carbon-pricing scheme. This has been the source of considerable opposition to carbon pricing from the coal industry, supported by mining and industry more broadly. To keep the issue in perspective, the net cost of Australian carbon pricing to coal mining represents much less than 1 per cent of the revenue loss from the fall in international prices from 2011 to 2013, and less than 5 per cent of the gain from the fall in the dollar between March and September 2013. The costs of permits to coal mining, as for other business, would fall by two-thirds with the link to Europe in 2014 or 2015, if European prices remained at their current levels.

The Coalition envisages retaining elements of existing policy under the rubric of Direct Action. There is bipartisan support for the Renewable Energy Target, which will be the main source of emissions cuts in the electricity sector until the European–Australian carbon price rises considerably. The government is committed to retaining the Australian Renewable Energy Agency, which provides support for innovation in low-emissions technologies. Modification of the former government's Carbon Farming Initiative can be seen as an element of Direct Action. Carbon pricing interacts productively with each of these ways of reducing emissions.

The new government has placed considerable emphasis on the potential for sequestration of carbon in soils, woodlands and forests. Prime Minister Abbott has often named my work as an authority for his statements about meeting Australia's targets in this way. It is worth putting much effort into technology for measurement and sequestration, and into leading the international community into wider recognition of its contribution. It has to be recognised, however, that these are early days, and that for soil and woodlands we are talking about technical possibilities rather than certain, internationally recognised methods to reduce emissions.

Other Direct Action measures to which the minister for environment has alluded also have potential for curbing emissions, although we do not know how much and at what cost. The most productive of these could be

brought within the framework of the established system, where they would be funded by part of the revenue generated by carbon pricing.

The new government is bound by its election commitments to introduce legislation to remove carbon pricing. That legislation will pass the House of Representatives. If the legislation were to succeed in the Senate, it would deepen the budgetary problems with which the government will eventually have to deal. It would lead to larger sacrifices of productivity than would be necessary with broadly based carbon pricing. It would lead either to much higher costs later in the decade or to Australia breaching its commitments to the international community and damaging its own interest in the global mitigation effort. And it would set the Australian polity on another long journey to find a way to make our contribution to combating global climate change, distracting the government and the polity from the great economic challenges facing Australia.

It would be a victory that the government may come to wish it had not won.