# Lower Emission Levels and Australian Energy Impacts

By Alan Moran*

**Australian and International Proposed Measures**

The Stern Report sought reductions in global emissions of carbon dioxide by 80 per cent of current levels by 2050. Stern argued that the economic cost will be one per cent of world GDP, "which poses little threat to standards of living given that the economic output in the OECD countries is likely to rise by over 200 per cent and in developing countries by more than 400 per cent" during this period (P.239).

The Waxman-Markey Bill requires a 20 per cent reduction in U.S. emissions by 2020 and an 83 per cent reduction by 2050. Such a level of reduction would bring U.S. emissions to the present world average and is consistent with stabilizing global $CO_2$ equivalent emissions somewhere between the present 450 and the projected 550 parts per million.

Unsurprisingly given the volume of international meetings and consultations involved, Australia's trajectory $CO_2$-e plans are similar to those of other countries.

| Country | 2020 targets | 2020 per capita reduction | 2050 targets |
|---|---|---|---|
| Australia | 5-15% below 2000 levels (4-14% below 1990 levels) | 27-34 % below 2000 levels (34-41% below 1990 levels | 60% below 2000 levels (60% below 1990 levels) |
| EU | 20-30% below 1990 levels | 24-34% below 1990 levels | 60-80% below 1990 levels |
| UK | 26-32% below 1990 levels | 33-39 % below 1990 levels | 80% below 1990 levels |
| U.S. | Return to 1990 levels | 25% below 1990 levels | 80% below 1990 levels |

*Comparisons in $CO_{2\text{-}e}$ Levels*

All developed countries have incurred considerable costs in subsidising and regulating in favour of high cost energy sources with low $CO_2$ emissions. In spite of this, and the fact that the early gains are likely to be the easiest because they tap into the fabled "low hanging fruit", few major signatories will meet their Kyoto obligations.

Individual European Union countries will achieve their targets - Germany because of unification, and the United Kingdom because of the shift from coal powered electricity generation to gas.

The Australian Government involves itself in some aggressive chest thumping in arguing that its per capita reductions in 2020 are greater than those of its fellow carbon cutters. Australia claims to be meeting its (generous) Kyoto 2008-12 target of 108 per cent of 1990 levels but would be 30 per cent above 1990 levels were it not to measure its emissions on the basis of the creative 'Australia clause' in Article 3.7. That clause permits countries to count changes to land-use and forestry as part of their measures of net emissions.

The nearby table is drawn from the latest United Nations Framework Convention report and indicates levels of achievement compared to the 2008-12 targets expressed as the emissions in excess of, or below the 1990 base level. The latest data for 2005 levels is expressed on two bases: with and without counting land use changes as a result of policy towards clearing land for cultivation. Only the EU taken as a whole is close to the targets in the form they were originally agreed.

| | 2008-12 Target | 2005 actual Inc. clearing | 2005 actual Exc. clearing |
|---|---|---|---|
| Australia | 8% | 4.5% | 25.6% |
| Canada | -6% | 54.2% | 25.3% |
| EU | -8% | -4.0% | -1.5% |
| Japan | -6% | 7.1% | 6.9% |
| NZ | 0% | 22.7% | 24.7% |
| Norway | 1% | -23.1% | 8.8% |
| U.S. | -7% | 16.3% | 16.3% |

*Kyoto Commitments and Achievements over 1990 Baselines*

Source: UNFCC. http://unfccc.int/resource/docs/2007/sbi/eng/30.pdf

**The Global Task**

In 2004, global greenhouse gas emissions (in $CO_2$ equivalents) were 28,790 million tonnes. Just over 10 per cent of these were from the former Soviet bloc with the rest split fairly evenly between the OECD countries and the developing world.

By 2008, developing countries' emissions exceeded those of the OECD countries. The faster growth in emissions within developing countries will increasingly dilute any actions taken by the developed OECD nations, the only group seriously considering abatement measures at the present. The dilution is further amplified if abatement in the OECD is achieved by smelting and other energy intensive activities being re-located to developing countries.

The IPCC report tended to downplay this leakage issue arguing: "Estimates of carbon leakage rates for action under Kyoto range from 5 to 20% as a result of a loss of price competitiveness, but they remain very uncertain."[1] Given the

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See footnote at end of text.

globalised nature of production and the incentives and necessities of businesses to relocate to venues where even modest cost savings are available, the IPCC's carbon leakage estimates may be too modest. To combat leakage, the EU is discussing countervailing duties on non-cooperating trade partners, a measure that would surely unravel the world trade regime.

It would require the adoption of as yet unknown fundamental technological developments to achieve any form of stabilisation at 2004 levels of 28,790 million tonnes. If the trajectory were global, stabilisation by 2030 with OECD countries reducing their emission levels by 20 per cent and the former Soviet bloc holding their emissions constant, then this would require developing countries to limit their increases in emissions to 15 GT (by 22 per cent). The contrast of this and business-as-usual (BAU) is illustrated below.

| | 2004 | 2030 | 2030 bau |
|---|---|---|---|
| OECD | 13319 | 10655 | 18350 |
| Former Soviet bloc | 3168 | 3168 | 3168 |
| Developing Countries | 12303 | 14967 | 36671 |
| Total | 28790 | 28790 | 58188 |

*Emission Stabilisation Scenario (million tonnes of $CO_2$ equivalent)*

Source: Derived from Human Development Report 2007/2008, UNDP

While superficially generous to the developing countries, the 22 per cent increase is a massive reduction compared with business-as-usual growth levels. Compared with the 15 billion tonnes of carbon dioxide equivalent projected under this scenario, business-as-usual levels - based on previous growth rates - would see developing countries emitting over 37 billion tonnes in 2030.

Moreover, because of their population growth, limiting developing countries' emission levels to 15 billion tonnes of carbon dioxide equivalent would result in their emissions per head actually *falling*. Developing countries in 2030 are estimated to have a population at 7.2 billion, and under this scenario their per capita emissions would fall from 2.4 tonnes to 2.3 tonnes. This is one fifth of the OECD 2004 per capita average of 11.5 tonnes and only a quarter of the OECD average in 2030 (7.9 tonnes) once a 20 per cent reduction and population growth is incorporated.

The surrealistic nature of this feature of the debate was illustrated by the main agreement negotiated at L'Aquila last July, about which Mr. Rudd was effusive in his recent address to the Lowy Institute. The L'Aquila agreement required the developed countries to reduce their emissions in 2050 by 80 per cent and the developing countries by 50 per cent. Present per capita emission levels of carbon dioxide are 11.5 and 2.4 tonnes for the developed world and the developing world, respectively.

Using simple arithmetic, by 2050 the 80 per cent cut would leave the developed world with 2.9 tonnes of carbon dioxide per capita and the developing world with less than half of this at 1.2 tonnes per capita. And this is based on the unlikely event of population growth in the developing countries slowing to the level of that in the developed world.

On top of their ethereal time frame, the targets are, therefore, internally inconsistent. Politicians are plucking goals out of the air for which they know they will never be held accountable. China and India rejected the L'Aquila agreement before the ink had dried.

**Australian Energy Resources**

Especially since it has been privatised or otherwise commercialised, Australia's electricity supply industry is among the lowest cost the world. Generation comprises

- 56% black coal,
- 24% brown coal,
- 13% gas
- 5% hydro
- with a little wind, which is highly subsidised

We have hundreds of year's supply of black coal that is of inferior export quality and ideal for local use and over a thousand years supply of brown coal that is not transportable at all. Supply continuity is not a problem.

This availability of coal gives Australia particularly low cost electricity compared with other countries; (major customers attract large discounts on these prices).

The sustainability of Australian prices at these levels changes with a cap on carbon emissions and the associated tax. Australia's particular vulnerability to these measures is illustrated by comparing our generation source profile with that of other countries. Only about 5 per cent of Australian energy is derived from other than fossil fuels. Sweden, Switzerland and France with nuclear and hydro have over 40 per cent and most other countries are 10-20 per cent.

**A Carbon Tax and its Effects**

In terms of electricity generation costs, a carbon tax of $40 per tonne doubles the price of Australian coal based electricity. However, the objective is not to increase the price of electricity but to prevent $CO_2$ emissions and this would require far greater price effects.

Carbon Capture and Storage (CCS) development requires one third of the coal for $CO_2$ capture even before there are any transport and storage costs. The price of coal based generation incorporating CCS is likely to go beyond the $125 a tonne modelled below, which even though wind and some other solar is shown to be competitive, this can never fuel a modern power system.

Natural gas is a replacement source of energy for coal and only incurs half the carbon tax. It also involves a lower capital outlay and less risk in the event of it not proving the best bet to combat regulatory measures.

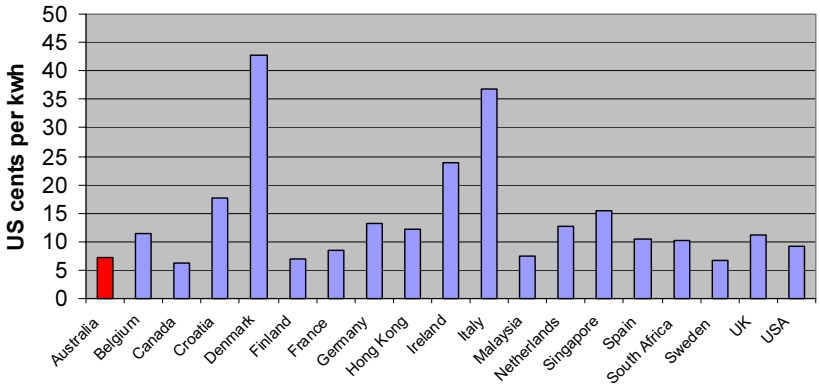
**But irrespective of the costs, it's not possible to meet the targets, without CCS if coal is used.**

Australia has considerable reserves of gas, especially coal seam gas in Queensland. This is, however, more expensive to develop than conventional sources of natural gas and even they are 20-30 per cent more expensive than coal for base load supplies and may see that premium rise as a result of international demands.

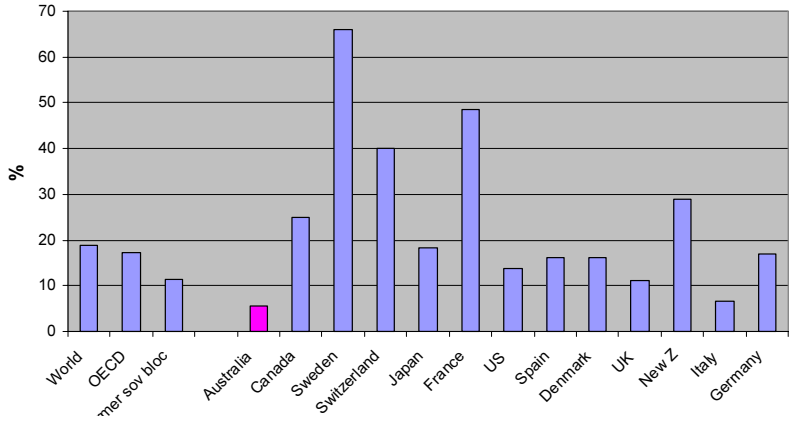
The real issue regarding the substitution of gas for coal in electricity generation, aside from finding the capital, is that it is a forcible self-denial of the cheapest form of electricity, the consequences of which reverberate through the entire network of costs.

The carbon cost impost smashes Australian industry competitiveness.

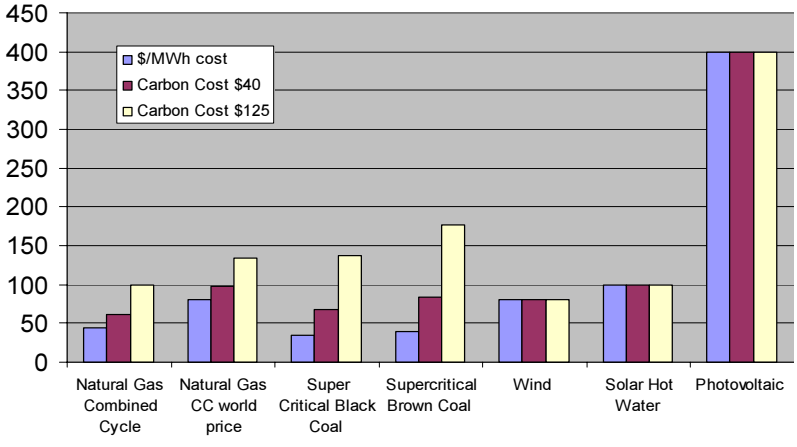
Even if all countries were to apply a similar tax, as is envisaged in the Copenhagen treaty, Australia would still lose its competitive edge since this is based on supplies of well-located coal which would become dearer than nuclear energy.




*Consumer Electricity Prices*




*Non-fossil Fuel Share*




*Economics of Differing Fuel Sources*

Once in place, the carbon tax means that nobody will again build an aluminium smelter, a steelworks or any other facility that makes use of Australian low-cost energy. These major energy intensive Australian facilities owe much to the oil crises of three decades ago when smelters based on fuel-oil generated electricity could no longer be economic. Australia's coal created a gravitational pull that was a vital part of the development and prosperity that we have since enjoyed. We are now trying to reverse this.

**Application of a Carbon Tax in Australia**

On any basis a carbon tax will raise colossal revenues. Those to be raised in Australia are envisaged

to be somewhat differently expended from those in the U.S. and EU. In Australia the Government is offering compensation to the brown coal generators of only about 35 per cent what they think they should have.

It is also making that compensation contingent on the generators remaining open. This is an ostensibly ridiculous requirement, since those generators must close if meaningful reductions in emissions are to be brought about. However, it recognises that if they close there will be an immediate electoral downside because Australia would lose 85 per cent of its generation capacity, with Victoria losing 95 per cent.

Treasury's October mid-year statement indicated ETS revenues of $16 billion a year by 2020 and growing. These numbers incorporate uncertain prices but if Australia reduces emissions by 5 per cent below 2000 levels by 2020, in line with the minimum Government's intentions, this would entail $16 billion costs at a price of $40 per tonne of $CO_2$. If this is the assumed price it means the government is not budgeting for purchases of overseas emission rights. Although the Treasury discusses these purchases, it does not quantify them in its latest document. Treasury modelling estimates overseas purchases at $26 billion a year by 2050.

| Fiscal Balance ($) | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 5 yrs to 2012-13 | 12 yrs to 2019-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Revenue from sale of permits | 0 | 0 | 4450 | 11480 | 12070 | 12650 | 13360 | 13990 | 14640 | 15290 | 15990 | 15930 | 113920 |
| Assistance measures | | | | | | | | | | | | | |
| Assistance for low & middle income households | 0 | 0 | -1496 | -5063 | -6430 | -6560 | -6700 | -6880 | -6970 | -7100 | -7190 | -6559 | -54389 |
| Fuel tax offsets | 0 | 0 | -1010 | -2220 | -2550 | -2290 | -2350 | -2410 | -2460 | -2500 | -2530 | -3230 | -20320 |
| Assistance to Emission Intensive Trade Exposed Industries | 0 | 0 | -1200 | -3220 | -3510 | -3830 | -4210 | -4330 | -4640 | -5070 | -5530 | -4420 | -35540 |
| Electricity Sector Adjustment Scheme | 0 | 0 | -260 | -680 | -730 | -790 | -850 | 0 | 0 | 0 | 0 | -940 | -3310 |
| Climate Change Action Fund (a) | -200 | 0 | -700 | -600 | -450 | -348 | -150 | 0 | 0 | 0 | 0 | -1803 | -2750 |
| Transitional assistance for Greenhouse Gas Reduction Scheme | 0 | -300 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -130 | -130 |
| Total Assistance Measures | -200 | -130 | -4666 | -11783 | -13670 | -13818 | -14260 | -13620 | -14070 | -14670 | -15250 | -17082 | -116439 |
| Net Impact | -200 | -430 | -216 | -303 | -1600 | -1168 | -900 | 370 | 570 | 620 | 740 | -1152 | -2519 |
| Cumulative Impact (a) | -203 | -633 | -848 | -1152 | -2752 | -3919 | -4819 | -4449 | -3879 | -3259 | -2519 | -1152 | -2519 |

Like with the energy intensive industries, one outcome of the tax is that no firm can ever again build a coal based power station unless it receives a tax indemnification from the government. It is untrue that all we need is to clarify the regulatory arrangements so industry has certainty. The only certainty is that the carbon tax rules out, as it is intended to, any investment in a coal fired power station, without an indemnification guarantee from government and makes gas fired generation problematic.

Gradually, even if not suddenly, this brings increased costs and a reduction in reliability of the electricity system.

This means a slow strangulation of supplies and certainly means we exit key areas of the economy, especially smelting that uses about a quarter of existing electricity supplies. Tragically, even unwinding the death sentence on existing coal based power generation would not undo the damage that has been done. We have not had a major power station commissioned since 2002 and this leaves a gap in supplies, meaning higher prices and no more energy intensive industries.

Mollified by the analysis of Treasury, the Government is remarkably complacent about the effects on the economy. Treasury modelling shows a smooth progression to a carbon free energy environment as the century progresses.

Here's what your Prime Minister said:

> *Treasury modelling done in 2008 demonstrates Australia can continue to achieve strong trend economic growth while making significant cuts in emissions through the CPRS. Treasury modelling also demonstrates that all major employment sectors grow over the years to 2020 - substantially increasing employment from today's levels. Treasury modelling also projects that clean industries will create sustainable jobs of the future - in fact by 2050 the renewable electricity sector will be 30 times larger than it is today*

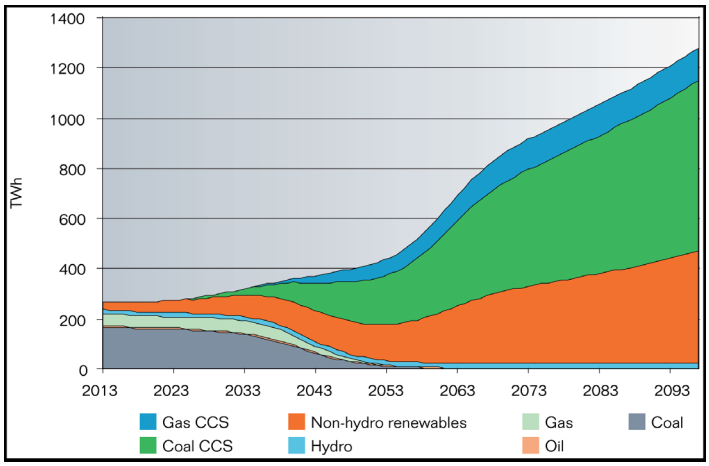
This reproduces one scenario which the Australian Treasury envisages from the taxation regime recommended. By around 2050, 80 per cent of electricity is modelled as coming from exotic renewables and from gas and coal incorporating CCS.

The numbers are, however, pure conjecture. Though the economic modelling driving them is based

on empirical observation, the uncertainties of projections going decades into the future are seldom raised.

The models themselves rest on demand and supply responses estimated as a result of known relationships between different products. But information on the relationships that are central to modelling forecasts is based on quite narrow ranges of observations, and the relationships can also change markedly over time.

Many relationships within the operational parameters of these models are, however, likely to be stable. We can be pretty certain, for example, of the demand response for, say, coal and the implications throughout the economy where price rises by 10 per cent. We would see some shift to other energy sources which have costs below the 10 per cent price increase; we would see some reduction in the end products using coal as a result of higher costs. And we would see some expansion in demand for products that use less coal and less energy, since these will have become relatively cheaper. All these changes would offset somewhat the initial loss caused by the increased cost.




*Australia's Electricity Generation Technology Shares, 550 ppm Scenario*

We also have experience of considerable changes in energy supply and the associated price increases. During the 1970s the price of crude oil quadrupled over a short period of time. This caused major economic dislocation and the worst recession since World War II. However, adjustments were made relatively easily because ways were found to economise on oil. These included substitutions by coal and natural gas and, for those nations not spooked by green witchcraft, nuclear power. The higher prices also stimulated increased oil supplies.

In the present modelling situation, such secondary effects would be confined to an expansion of nuclear power, currently representing 16 per cent of world electricity supplies, since this is the only feasible replacement for carbon-based fuels.

At issue is whether the situation being modelled is comparable to what we would face in estimating the effects of a tax designed to eliminate a product within a class of goods or that designed to eliminate the entire class. This can be visualised best with respect to the food sector. We could, for example, be quite confident of assessing the effects of a tax that drove out the use of oranges. People would choose alternative goods; there would be some loss of welfare, perhaps measurable in terms of gross national income. But there would be little major change.

Substitute for that measure a tax designed to eliminate consumption of all known foods. Clearly there would be mass starvation, and considerable loss of income, though new foods might be developed to allow continued human existence.

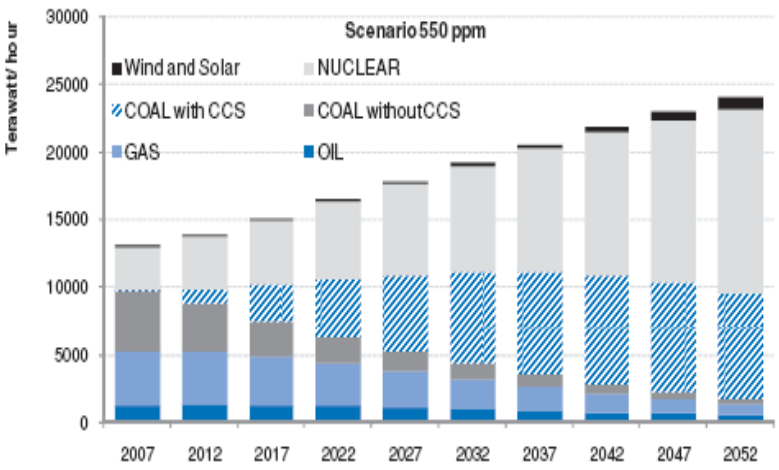
Some say such effects overstate the implications. After all, energy is only 5 per cent of GDP and rather less than this if its distribution costs are excluded. But much the same can be said of food, which in rich countries comprises only some 12 per cent of GDP and most of this is distribution and value-added features.

The question about a carbon tax designed to stabilise global $CO_2$ emissions that required countries such as Australia to reduce their emissions by 80 per cent is whether the better analogy is the tax on oranges or a tax on the whole class of foods.

Present-day energy consumption is highly reliant on carboniferous fuels. Energy itself is, second to food, the basic building block of all human activities. The only substitute we have for carbon-based energy is nuclear energy. With a carbon tax we have only the flimsiest of experience on which to model the effects. Unlike the case with oil in the 1970s, the substitutes do not exist, except for nuclear, and to enable that to replace carboniferous fuels requires great ingenuity—especially in finding ways to replace oil for motor vehicles, ships and aircraft.

In addition to such considerations, the modelling assumes a steady state movement from one pattern of the economy to another—it assumes that we simply move from coal to gas to some as-yet-undiscovered renewable, carbon capture, or nuclear. Such a movement is unlikely to occur without, at the very least, considerable transitory turmoil.

Importantly, modelling, in addressing a frictionless move to alternative energy sources, is driven by




*OECD Estimates of World Electricity Generation*

assumptions about new technologies yet to be devised like Carbon Capture and Storage (CCS).

In this sort of long-term economic modelling new technologies are assumed to develop without any evidence that this is possible. Without that, the costs of forcing emission reductions would be driven to astronomical levels and would bring a rapid reduction in living standards.

In a notable sign of sanity, the OECD climate change projections forecast only a miniscule role for renewable energy. The OECD projection's credibility is also enhanced by envisaging a sizeable increase in nuclear but it too has CCS playing a major role at some 30 per cent.

Al Gore opined on Australian television that CCS would never work. Many of us would agree. He went on to say however that Australia has a lot of sunshine and potential for renewable power. The absurdity of that statement is matched only by Prime Ministerial assertions using the results of the garbage-in-garbage-out assumption driven Treasury modelling to maintain that we will have more green jobs and full employment. Not only is this technology based forecasting pure conjecture but full employment is a basic assumption - not an outcome - of all such modelling.

**Existing Measures**

The foregoing examines the issues from the point of view of the ETS greenhouse tax. However, this is not being introduced within a policy vacuum. Already Australia, like other countries, has a considerable number of de facto taxes and subsidies ostensibly designed to combat $CO_2$ emissions. These include

- Subsidies to green energy that amount to at least $1 billion a year.
- The Mandatory Renewable Energy Target requires 9,500 GWh of renewable electricity by 2011 – about 4% of the total. The states have supplementary schemes. Victorian Premier Bracks in November 2005 argued that a, "lack of national leadership" by the Federal Government in not increasing the MRET scheme from the 9500 GWh target, "is costing Victoria – economically and environmentally – and cannot be allowed to continue." Victoria's scheme requires an additional 3,274 GWh a year of renewable electricity by 2016. It was expected to create "up to 2,000 new jobs, most of them in regional Victoria". None emerged. The state schemes are to be folded into the recently passed requirement for 20 per cent renewable energy 45,000 GWh. In a triumph of hope over logic and experience, this regulatory measure requires a doubling of renewable energy use by 2020. Based on the penalty costs involved, and excluding the (commercial) hydro portion, this entails annual aggregate costs of $1.8 billion.

The identified subsidies and estimated tax costs of the renewable requirement of $2.8 billion a year can be viewed as a tax on the 205 million tonnes of $CO_2$ emitted in the course of electricity generation. This is the regulatory equivalent of a carbon tax of over $13 per tonne of $CO_2$, a level that at one time was said to be all that was required to bring about the necessary abatement.

**Export Effects**

Rarely mentioned in the Australian context is energy exports. Coal accounts for 23 per cent of exports with gas and oil another 10 per cent.

The logic of a world in a carbon lockdown is that all of these exports would eventually be eliminated – the coal in the ground even with a value of only $10 per tonne is worth something like a year's national income. Although Australia also has massive uranium resources these would not plug the gap.

**Concluding Comments**

From the Australian Treasury modelling it is possible to infer the costs of doing nothing to 2020 and then catching up with the 2050 target thereafter should the need and achievability of such action prove necessary.

The Prime Minister says Treasury modelling shows that deferring action will increase the costs of achieving the results by 15 per cent compared to taking action now. Yet, the cost of deferring action to

2020, then catching up by 2050, according to the Treasury model is 0.3 per cent of GDP. Even if this is not overstated, 0.3 per cent of GDP seems a reasonable insurance policy price to pay to avoid imminently embarking on measures that would have dramatic consequences on a small economy that is highly dependent on carboniferous fuels. By 2020 we will be clearer on the need for emission reduction policies and we will, presumably, have access to all the technological advances that modellers claim will be forthcoming.

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Another way of analysing this is to determine the costs that would allegedly be incurred from taking no action at all. Again using the Treasury modelling, we can see the costs of doing nothing to defray emissions is 5 per cent of GDP by the end of this century. Significant though this may be it is dwarfed by the increase in GDP - sixfold - that is estimated to take place. Those costs are therefore readily affordable even if they exist.

There may be a risk from severe anthropogenic induced climate change. But there is also a risk of severe economic consequences in seeking to address such change. Deferring action until the costs and the implications of doing nothing are clearer is likely to be the best approach given the costs involved.

**Footnote**

[1] http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter11.pdf p622

**Postscript:**

The foregoing was written as the details were emerging of the leaked emails from the Climate Research Unit at the University of East Anglia and prior to the collapse of the December 2009 Copenhagen Climate Change Conference.

The diplomatic outcome of Copenhagen stemmed from the refusal of China and other key countries to accept major reductions in their emissions because this would seriously harm their economic prospects.

Developments in the science of greenhouse can only add to such reticence.

In its 2007 report, under pressure from statisticians, the IPCC was already downplaying its "hockey stick" depiction of a uniquely steeply rising temperature trend starting 30 years ago. The "Climategate" leaking of emails in late 2009 indicated a willingness of key IPCC scientists to use highly unethical measures to suppress dissent from their own views. Since then, the IPCC has recognised its 2007 report's contention that Himalayan glaciers are likely to melt by 2035 was incorrect and has acknowledged that its claims of a rapid reduction of the Amazonian rainforests were based on material from an advocacy group's rather than scientific research.

As of February 2010, the accuracy of the basic temperature data was being questioned. *The Guardian's* Fred Pearce reported, "crucial data obtained by American scientists from Chinese collaborators cannot be verified because documents containing them no longer exist. And what data is available suggests that the findings are fundamentally flawed".

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