

# Developing Australia's non-fossil fuel energy industry

Costs of measures targeting CO<sub>2</sub> emissions

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and Resources Review of Renewable Energy in Australia

Alan Moran

Institute of Public Affairs  
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## Non-fossil fuel energy

### The Stern Report

Harnessing the UK Kyoto Treaty negotiating team, Sir Nicholas Stern has lent his name to a report, issued earlier this year that managed to raise the ante on costs of not restraining emissions at the same time as it understated the costs of acting.

The bottom line of the Stern report is that it assesses the damage from global warming if left unchecked would be 20 per cent of world GDP. These costs are far more severe than those in the Intergovernmental Panel on Climate Change (IPCC) report itself. And the outlays for the abatement action he proposes amount to a mere one per cent of world GDP.

Stern came to this scenario by taking all the 'worst case' estimates of detrimental effects and the 'best case' cost measures. He assumed a great deal of emission reduction would be achieved by 'education'. Heroic and highly unlikely assumptions were made about the pace at which renewables would improve their efficiency levels.

Another major driver of the low costs in Stern is the valuation of time he uses. In contrast to commercial discount rates—which are anywhere from 7 per cent to 15 per cent—Stern used a rate of under 1.5 per cent. This means the future costs are far greater than in conventional analyses.

Even though it is over 700 pages long, the Stern Report itself was highly selective in its evidence. It did not mention the House of Lords very distinguished Economic Affairs Committee report published in July 2005 that included several senior businessmen and scientists and was headed by a well regarded secretariat. That committee arrived at far less alarmist conclusions. It expressed concern that, 'UK energy and climate policy appears to be based on dubious assumptions about the roles of renewable energy and energy efficiency'. In fact, it is surely no coincidence that Stern was appointed by Chancellor Gordon Brown not long before that House of Lords Report was due to be handed down.

There was no sensitivity analysis in the report, in spite of its length and there was no consideration of the nuclear option in the Executive Summary.

### The Australian debate

One matter of neglect in the Australian climate change debate is that no government agency has undertaken—or at least published—the aggregate costs of the measures presently in place.

The Department of the Environment has attempted to amass all the Commonwealth data but this is not complete

and of course does not include the separate state schemes and the regulatory taxes. And although we have pieces commissioned by governments from CSIRO and others into the outcomes of global warming for the stone fruit industry, Alpine ski industry and other sectors, there is no estimate of the aggregate benefits of taking these measures and hence of the limits of such expenditures.

This might be partly due to the fact that the promoters of these policies have little interest in economics or the costs that their favoured approaches impose on the community. But government central agencies are seriously amiss in failing to require such analysis. It would be inconceivable that they would overlook evaluating a scheme that said, 'No child shall live in poverty' or 'All children will receive education up to Year 12', or even, 'We shall purchase four new frigates'.

Kevin Rudd has assembled the National Climate Change Summit, which 'will bring together business leaders, scientific experts, and environmentalists with community and political leaders to share ideas about addressing the threat of climate change.' The summit will doubtless tell us about how we will save the world, spawn vast new productive industries and save money by using less electricity. All we need to do is follow the examples of such luminaries as Al Gore and Bob Brown and stop air travel move into small homes and wear woolly jumpers!

### Australian costs incurred in defraying CO<sub>2</sub> emissions

Even though we don't have a compendium of schemes we do have a plethora of them. These fall under three categories: obligations imposed on consumers to take a given amount of renewables or low carbon emitting energy subsidies by governments to the CSIRO, for carbon dioxide reductions and so on; and the regulatory impositions on consumers and businesses designed to redirect purchases away from the avenues they would otherwise prefer.

#### A) Obligations on consumers

These are found in four pieces of legislation:

- The Commonwealth's Mandatory Renewable Energy Target (MRET) requires an increasing amount of electricity sales to be purchased in the form of sources that are designated as eligible renewables. By 2010 9,500 GWh (around 4.5 per cent of supply) must be so sourced with a fall back cost of \$380 million from the \$40 per MWh penalty.
- The Queensland 13 per cent gas requirement applies to a load of about 40 million GWh by 2010 (9 million is exempt and load losses are assumed at 8 per cent). The penalty for shortfall is \$15 per GWh (not tax de-

ductable) indexed at the CPI. By 2010 the scheme is estimated to cost \$97 million. With great fanfare in June 2007 the Queensland Government launched a, ‘\$414 million climate change strategy ClimateSmart 2050’, though it is not clear what additional funding this will entail.

- The Victorian scheme requires 10 per cent renewables or 3672 GWh per annum when it hits maturity (around 2015). The penalty rate is \$43 indexed with the CPI. If it were assumed to be mature in 2010 the penalty rate at, say, \$47 per MWh means a cost of \$184 million.
- The NSW scheme is actually targeted at greenhouse emission levels rather than using essentially wind power as in the Commonwealth and Victorian schemes or gas in the Queensland scheme. Based on published material, NSW retailers by 2011 are required to buy credits to offset 13,600 tonnes of CO<sub>2</sub> (over and above MRET obligations) with a penalty of \$13.36 per tonne. This is a cost of \$182 million (and will continue to rise indefinitely).

These four schemes amount to an annualised cost of \$843 million. Currently MRET emission credits are selling at a 25 per cent discount to the penalty rate. If other schemes are similar, this reduces the costs to \$600 million.

### B) The direct government expenditures and subsidies

These cover diverse issues like staffing of the Environment Department (DEH), the Greenhouse Office and the CSIRO.

Many programs were started as part of the Club of Rome inspired hysteria about us running out of all manner of resources including energy. Such notions after a quarter of a century of remission are back with us in the form of fears on ‘peak oil’ but in the interim were converted, without missing a beat, into greenhouse mitigation measures. DEH estimates these across the Commonwealth as (\$M):

• Greenhouse Gas Abatement Program	21
• Solar Cities	20
• Low Emission Technology Demonstration fund	50
• Payment to states (renewable equity, photovoltaics, etc)	36
• Others	154
• Total	\$281 million

And new schemes are rolled out with alarming frequency. In April to placate the concerns anticipated by the Stern visit, Minister Turnbull announced a \$200 million scheme to mitigate greenhouse gas emissions by saving Indonesia’s forests.

Other expenditures not included are those of the Co-operative Research Centre, the program documentation of which is opaque, though they did commission work

that purports to demonstrate that they have contributed mightily to the national income. From CSIRO we can discern CRC expenditures on greenhouse in 2005/6:

- \$4 million lignite clean coal
- \$13 million for GHG and sustainable development coal
- \$5 million for GHG accounting

There are many other measures in place to serve the same ends, programs like Green Buildings, greenhouse gas accounting, some overseas aid and some coastal and Great Barrier Reef spending, public transport, urban consolidation—in fact one is hard pressed to find policy interventions that do not have a climate change dimension. The total would certainly exceed \$300 million per annum.

In addition most of the states are convinced that with an active industry policy favouring renewables we will capture a considerable share of the coming booming world market for such facilities as well as contributing to saving the world. Those state based expenditure schemes that can readily be estimated include:

- NSW claims to be spending \$40 million a year in a 5 year program.
- Queensland has set aside \$300 million from the sale of its electricity retailers to be spent over an unspecified time frame.
- Victoria says it is spending \$106 million over 5 years.
- The other states are probably spending less than a few million a year.

If none of the claimed state expenditure is money reallocated from the Commonwealth it may add up to a further \$90 million a year.

### C) Regulatory measures include impositions on businesses and on consumers

These are very attractive to governments since their impact is not readily assessable. They include measures ranging from preventing businesses from starting a new facility unless it is greenhouse compliant, through stopping some ventures from proceeding, to placing a regulatory tax on the consumer.

Among the consumer taxes are all measures which limit choice. They include energy efficiency measures for fridges, small electric heaters, and especially housing. For new housing, the 5 Star energy saving requirement adds somewhere between \$7,000 and \$14,000 per house. With 150,000 new houses each year, this is an annual imposition of between \$1,000 and \$2,000 million.

This is an ideal regulatory measure for a cynical government to implement since it is not likely to cause a voter backlash. It falls only on the new house buyer, thereby

allowing established homeowners, especially those, like Sir Nicholas Stern, who live in old houses, to avoid any personal cost while smugly basking in the planet-saving expenditures of those who are vastly poorer than us. It might be claimed that (unlike the MRET schemes) these requirements have an offsetting benefit but the new home buyer would see this as inadequate (otherwise the measure would not be necessary).

Adding to those already in the pipeline is a whole raft of energy efficiency requirements proposed for commercial buildings.

In summary, Australians are incurring expenditures comprising at least the following:

- \$600 to \$850 million in state and federal requirement for wind and other preferred sources.
- \$330 million in Federal and State subsidies and other disbursements to promote reduced emissions.
- At least \$1 billion and possibly more than \$2 billion in regulations on purchases, mainly houses.

The above three classes of measures alone come to \$2 billion and \$3.2 billion a year. In terms of a greenhouse tax on emissions this is equivalent to \$3-5 per tonne or \$5-8 per tonne on the stationary sources like power plants. While Stern estimates a tax of \$US 100 per tonne would be necessary and others have put a tax at \$US 24 for less draconian reductions than that emerging from the Stern recommendations of 60 per cent. EU countries have a plethora of regulations and de facto taxes. In addition to these, the EU has a cap and trade approach, which because governments have overstated their base level emissions to obtain more generous future caps, is currently trading at much less than one euro per tonne of CO<sub>2</sub>.

And on top of these costs are the compliance costs caused by distortions to firms' decision making. These include moves like that of the NSW Government to prevent the building of a power station it had contracted, Redbank 2, and the millions of additional dollars that the Victorian Government caused International Power to incur to upgrade its Hazelwood facility. The costs of this sort of intervention are difficult to assemble but might be in the hundreds of millions and they certainly result in massive sovereign risk costs.

In addition to these are regulatory impositions on business which lead to compliance costs as firms seek to meet consumer demands in ways that avoid them. We might be seeing a facet of these in electricity where forward prices are high but no private sector money is looking to build a coal fired power station. Such investment inaction brings higher electricity prices as a result of the risk of future punitive action irrespective of what action might be taken.

Among these additional costs are the paperburden costs imposed on firms. One set of these is the audits required

of businesses by the government to demonstrate that they are looking after their shareholders' interests adequately in saving money on energy use. Other than that there are massive lobbying costs as industry associations seek favours or try to avoid damage to their clients in wind, coal, hydro, transport, and building design.

This is among the matters that the Prime Minister's Task Group on Emissions Trading would have been mindful of when it said, 'The sheer number of abatement programmes across levels of government also imposes compliance costs on industry, with businesses often required to repackage data for several programmes. Regulatory approaches often impose a heavy burden of 'red tape' on industry.'

Governments in Australia now say how they favour a price signal for carbon so that the market can meet the policy goals at the lowest cost. The tradeable right variant is preferred. Unfortunately, what politicians normally mean by making use of a 'carbon signal' is not, 'We will abandon all the current interventions in the market place - the subsidies, the taxes, the regulatory requirements - and replace them by a single scheme that uses market forces.' Rather they have heard from economists that there is a means of augmenting the measures they have in place in a way that is good and just. The market mechanisms offer a means by which politicians can place yet another level of taxes or regulations upon us to placate the noisy interest groups that are calling for action and, possibly, to garner more revenue.

## Cost of alternative fuel sources

The following estimates of future electricity costs (see Table 1 on the following page) draws from material assembled by SKM regarding projections of technology developments to construct a hierarchy of costs in the year 2010. The costs of providing electricity from the various sources are listed in the third column and the costs with a CO<sub>2</sub> charge of \$40 per tonne are listed in the final column.

Of course, if the implicit price of \$40 is insufficient to encourage new energy sources/bring about the required lower energy usages a higher charge would be necessary. It has already been mentioned that Stern's recommendations, notwithstanding some optimistic assumptions about voluntary emission reductions, equates to a price of \$US 100. In that event all the fossil fuel sources would become more expensive with coal costs ranging between \$124 and \$172 per MWh.

Many of the assumptions about future technology improvements incorporated in the above estimates are likely to prove incorrect.

**Table 1: Costs of different fuel sources for electricity**

	Estimated Position in 2010		
	kgs CO <sub>2</sub> /MWh	\$/MWh cost	with CO <sub>2</sub> at \$40/tonne
Natural Gas Combined Cycle (low)	430	35	52.2
Natural Gas Combined Cycle (high)	430	45	62.2
Super Critical Black Coal (low)	780	30	61.2
Super Critical Black Coal (high)	820	35	67.8
Supercritical Brown Coal (low)	1000	36	76
Supercritical Brown Coal (high)	1100	40	84
Wind (low)	0	55	55
Wind (high)	0	80	80
Small Hydro (low)	0	50	50
Small Hydro (high)	0	70	70
Solar Hot Water (low)	0	80	80
Solar Hot Water (high)	0	100	100
Photovoltaic (low)	0	250	250
Photovoltaic (HIGH)	0	400	400
Nuclear	0	60	60

**Source:** IPA

Thus, a lower price estimate for wind is \$55 per MWh, a price that cannot be conceivably achieved. Wind is now a relatively mature technology and major advances in its cost reductions are unlikely. In addition, the inherent instability of wind and some other solar energy sources imposes additional costs in terms of ancillary services to ensure frequency control and back-up in the event of rapid changes in output. Wind, according to the International Energy Agency, is not capable of providing more than 9 per cent of aggregate generation for these reasons.

Similarly, the natural gas cost is heavily dependent on the raw gas price. This is at very low levels in Australia, half the price of many other countries. Its price, having increased markedly over recent years is set to rise further and it now seems unlikely that gas based electricity, even without a carbon imposition, could be generated at less than \$50 per MWh.

Nuclear costs are also uncertain and might be less than estimated since the costs themselves are enhanced by excessive regulatory oversight. In any event, with the sort of carbon charges widely surmised to be the minimum likely to emerge from major reductions strategies, nuclear becomes the cheapest source of electricity.

There are other possible technologies like harnessing tidal flows, tapping the heat in 'hot rocks' and the hydrogen economy. None of these have advanced to a stage where any reliable estimate of costs is currently possible.

## Concluding Comments

Kevin Trenberth is head of the large US National Centre for Atmospheric Research and key adviser in the UN's Intergovernmental Panel on Climate Change (IPCC). In a recent contribution to Nature magazine's Climate Feedback blog, he argues '... there are no (climate) predictions by IPCC at all. And there never have been'. Instead, there are only 'what if' projections of future climate that correspond to certain emissions scenarios.

Trenberth points out that the General Circulation Models that form the basis of these scenarios fail to consider some important matters like the recovery of the ozone layer, the state of the oceans, sea ice and soil moisture. Nor is an El Nino sequence modeled.

Such doubts about the value of the forecasts comes from a distinguished scientist not associated with the so-called 'climate sceptics'. It provides a further set of reasons, in addition to those like the relatively trivial effect of any such policies that can be seriously contemplated, for proceeding cautiously with any measures requiring abatement that will bring economic damage.