MYTHS, FALLACIES AND ‘SPIN’ ABOUT GREENHOUSE SOLUTIONS

Author: Dr Mark Diesendorf

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For decades the big greenhouse gas emitting industries have disseminated myths, fallacies, ‘spin’ and outright lies about the science of global warming from the human-induced greenhouse effect. They have deliberately sown doubt and confusion in the minds of politicians, journalists and members of the public at large. In 2006, greenhouse science, supported by observations of widespread and growing climatic impacts and popularised by Al Gore’s film *An Inconvenient Truth*, triumphed at last in the minds of the vast majority of Australians, who now accept that global warming is a real, major and urgent issue.

Now the vested interests, with the assistance of some politicians and some uncritical journalists, are disseminating misinformation and confusion about potential solutions to global warming.

This paper provides brief refutations of 12 fallacies about greenhouse solutions, and cites references where more detailed discussions have been published. Each fallacy is first stated in italics, then this author’s response is given in ordinary text.

Fallacy 1: Since Australia has only 1.4% of global GHG emissions, ratifying Kyoto and reducing Australia's emissions would have negligible international impact.

Australia's ratification of the Kyoto Protocol in December 2007 received immediate praise from international leaders. This international political impact is not surprising, because Australia is the world's biggest per capita emitter of greenhouse gases (apart from a few oil producing states) and was one of only two industrialised countries that were refusing to ratify Kyoto. If Australia followed up its ratification with support for strong targets for the post-Kyoto international agreement and backed up its words by initiating comprehensive domestic policies and actions to cut its own emissions deeply and rapidly, it would show the whole world that even a country that is highly 'dependent' upon fossil fuels could take its share of the responsibility. This would further isolate the USA and add pressure on the USA to ratify. It would also impact on Canada, which has reneged on its Kyoto commitment, despite being much less 'dependent' upon fossil fuels than Australia.

Ratification of Kyoto by the USA, and strong post-Kyoto policies to slash emissions by both the USA and Australia, are necessary pre-conditions for bringing developing countries such as China and India into an international agreement with targets and a timetable.

Fallacy 2: Coal power with CO_2 capture and sequestration (CCS) is the principal greenhouse solution.

Coal power with CCS is an unproven technological system. Although pilot plants could be built before 2020, if the government pours in enough money, this would still be a long way from full-scale commercial production with a high confidence in safety. The risks of CO2 escapes are substantial.

The interdisciplinary expert study on *The Future of Coal* from the Massachusetts Institute of Technology (Ansolabehere, 2007) envisages that coal with CCS may begin to make a noticeable contribution on a global scale around 2025 and may overtake renewable energy on a global scale around 2045. We cannot afford to wait that long.

Fallacy 3: Australia could develop the coal with CCS technology and sell it to China.

This is a delusion of grandeur. To develop this technology requires billions of dollars and a superpower economy (e.g. USA and EU). We should focus on the basic geology, so that, if and when CCS technology is developed overseas, we will have identified underground storage sites. In the foreseeable future, the most important role for CCS in Australia will be to separate and bury CO_2 from natural gas at the Gorgon gas field. Fortunately, this is much easier than separating CO_2 from coal.

Fallacy 4: Nuclear power is a suitable alternative or supplementary solution to coal with CCS.

Current reserves of high-grade uranium ore will only last several decades at current usage rate. Once they are used up, low-grade ore will have to be used. This means that, to produce 1 kg of yellowcake, 10 tonnes or more of rock will have to be mined and milled, using fossil fuels. Under these circumstances, the CO2 emissions from the nuclear fuel chain will be comparable with those of an equivalent combined-cycle gas-fired power station.

Government Ministers and nuclear experts have admitted that Australia's first nuclear power station and associated infrastructure would take 15 years to construct (assuming no public opposition).

Therefore, based on existing technology, nuclear power is neither a short-term nor a long-term solution to global warming. See also Diesendorf and Christoff (2006) and other briefing papers in this series on nuclear power.

Fallacy 5: The spent fuel from nuclear power stations cannot be used to make nuclear weapons.

This false claim has been refuted by many experts, including leading US nuclear bomb designer Dr

Theodore Taylor, Commissioner of the US Nuclear Regulatory Commission Dr Victor Gilinsky and the US Department of Energy (Diesendorf 2007a, chapter 12). An ordinary 1000 megawatt nuclear power station produces about 200 kg of reactor-grade plutonium annually, enough for 20 nuclear bombs.

It has also been claimed incorrectly that a nuclear power station based on thorium rather than uranium cannot produce a nuclear explosive. In fact, to use thorium as a fuel, it must first be converted to uranium-233, which is fissile and so can be used either to fuel a nuclear reactor or provide the explosive in a nuclear bomb.

The truth is that nuclear power and nuclear weapons are intimately linked. In addition to the dual uses of nuclear materials, training engineers and technicians for nuclear power provides most of the training required to develop nuclear weapons.

Fallacy 6: We have to choose between coal with CCS and nuclear power.

Neither coal with CCS nor nuclear power could make a significant contribution before the 2020s. Both are dirty and dangerous technologies. Therefore, this is a false choice. However, there is another choice: between unproven, polluting and dangerous coal and nuclear technologies on one hand and safe, proven, sustainable energy technologies on the other hand. Sustainable energy comprises efficient energy use and renewable sources of energy. Natural gas, the cleanest of the fossil fuels, could play a valuable role in the transition to a sustainable energy future.

Fallacy 7: Efficient energy use has little potential.

Detailed studies conducted overseas and within Australia (for example, under the National Framework for Energy Efficiency) show that there is huge potential for cost-effective energy efficiency. It is the cheapest and fastest greenhouse gas reduction measure. Efficient energy use has been held back by market failure (e.g. split incentives between landlord and tenant; lack of information; lack of appropriate institutional structures, such as energy service companies) and other barriers. Energy efficiency will increase rapidly once governments introduce regulations and standards for energy labeling and minimum energy performance standards for all buildings, appliances and energy-using equipment. A ban on new conventional coal-fired power stations is also essential. See also Roberts (2006).

Fallacy 8: Renewable energy cannot provide base-load (24-hour per day) power.

Bioelectricity, solar thermal electricity with low-cost thermal storage, and hot rock geothermal power (soon to be proven) are all base-load. In some circumstances (e.g. in Tasmania), hydro-electricity can provide base-load too. Even large-scale wind power, from geographically dispersed wind farms, can be made as reliable as base-load coal or nuclear power by adding a little peak-load power (e.g. hydro or gas turbines) which does not have to be operated frequently – see Diesendorf (2007a & b). Energy efficiency and solar hot water can reduce the demand for base-load power.

Fallacy 9:Base-load is the only important type of power.

Electricity supply systems cannot be composed of base-load power stations alone. Base-load power stations are inflexible and break down from time to time. They take all day to start up and then have to be operated close to full power day and night.

In Australia a large fraction of base-load coal-fired power is used to provide off-peak electric water heating from midnight to dawn, when electricity demand would otherwise be very low. If off-peak electric hot water were terminated and replaced with solar, gas and electric heat pump hot water, several coal-fired power stations could be retired or not built in Australia and millions of tonnes per year of CO2 emissions would be saved. Additional intermediate-load power from combined-cycle gas-fired power stations would also be required to substitute for the dawn to midnight contribution of those coal-fired power stations.

Most electric power is used during the daytime, so daytime power (from intermediate-load and peak-load power stations) is at least as important as base-load. Even in the absence of cheap electrical storage,

solar photovoltaic (PV) electricity will be able to make a large contribution to daytime power as its price declines in the future.

The water heating example shows that base-load power is to some extent an artificial construct. The important thing is to have a generating system that supplies clean, reliable electric power, while limiting wasteful demand growth. Renewable energy, coupled with efficient energy use and backed up with gas power for a transitional period, can do the job.

Fallacy 10: Renewable energy has huge land requirements.

Wind and solar power generally have smaller land requirements than equivalent coal power with open-cut coal-mines.

Wind power is normally installed on agricultural land, where its turbines and access roads occupy only 1–2 per cent of land area. The other 98–99 per cent of land can still be used for agriculture. To replace a 1000 megawatt coal-fired power station with wind power would require 5–20 square km of land actually occupied, depending upon wind speeds of the wind farm sites. Typical open-cut coal mines occupy over 50 square km. Even underground coal mines, using longwall mining technologies, can damage large areas of land.

A square of area only 22.6 km x 22.6 km = 510 square km could supply all of Australia's current electricity demand by converting solar energy at 20 per cent conversion efficiency without concentrators. With solar concentrators, a much smaller area would be required. The residential component of electricity demand could be supplied by covering about 28 square metres (5.3 m x 5.3 m) of rooftop space of each house with flat-plate solar PV modules.

Thus, no additional land would be required for residential solar electricity and the land required for commercial and industrial uses of electricity would be only a few hundred square km.

In practice, neither wind nor solar would supply all electricity, which would be provided by a broad mix of renewable sources.

Fallacy 11: A sustainable energy solution much more expensive than sticking with dirty coal power.

As the ExternE studies and the Stern Report recognise, dirty coal power is very expensive in terms of economic, environmental and health impacts. The costs of drought, increasing prevalence and severity of bushfires, loss of tourism at snow-fields and the Great Barrier Reef, and the impacts of rising sea-levels on urban infrastructure will be huge. But at present these costs are not included in the price of coal power in Australia. They are externalised. Carbon pricing, by means of a carbon tax or emissions trading, is a means of internalising at least some of these external costs.

Before a carbon price is implemented, all clean alternatives to dirty coal (apart from energy efficiency) appear to be more expensive than dirty coal power. However, the combination of efficient energy use and renewable energy is going to be much less expensive than coal with CCS without energy efficiency. This is because the economic savings from efficient energy use can compensate for much of the additional costs of renewable energy. Another way of stating this is that, although the cost of a kilowatt-hour of electricity will increase, the number of kilowatt-hours used will decline and so the total energy bill will not necessarily increase significantly.

If proponents of so-called 'clean coal' claim that they too can obtain the benefits of energy efficiency, it can be pointed out that energy efficiency has not been implemented to a significant degree with coal power. Indeed, one purpose of developing coal with CCS is to maintain endless growth in demand. Under these circumstances, it is unlikely that more than lip service will be paid to energy efficiency (the present situation).

Fallacy 12: Substituting energy efficiency (EE) and renewable energy (RE) for coal would lose jobs.

To the contrary, EE and RE can provide several times more jobs per kilowatt-hour in Australia than coal. This is because the smaller scale of sustainable energy technologies (compared with coal) lends itself to manufacture in Australia. For example, when a wind farm is built in Australia, over 50 per cent of the capital cost is spent in Australia. As the wind industry grows, the Australian content could grow to 75 per cent. Wind power currently employs in Australia 2–3 times the number of job-years per kilowatt-hour of coal power (including the associated coal mining), while bioelectricity employs 3.5 times (mostly in rural areas). Energy efficiency technologies and measures also employ several times more job-years.

As the result of automation, employment in coal mining has halved since 1986, even though the amount of coal mined has increased substantially. When a coal-fired power station is built in Australia, only about 25 per cent of the capital cost is actually spent in Australia. Similarly, large coal-mining equipment, such as dredges for open-cut mining and longwall diggers for underground mining, is imported.

It is simple to show that the job losses from the Australian coal industry from a 25 per cent renewable energy target could be addressed by not replacing a small fraction of the workers who retire annually from the coal industry. According to data from the Australian Bureau of Statistics, this industry currently employs directly about 24,000 people in Australia. Taking account of the fact that 80 per cent of Australia's coal is exported, there are only about 4,800 workers employed in coal mining for coal use in Australia. If renewable energy is increased from its current level of 9 per cent to 25 per cent of Australia's electricity by 2020 and if it substitutes for coal power, this means that 16 per cent of 4,800 direct coal jobs or 768 jobs would be affected. Over the 12 years from 2008 to 2020, this is 64 coal jobs per year, about one-tenth of the expected annual retirements from the coal industry.

Even allowing for a generous multiplier factor of 4 for indirect coal employment would not change the qualitative result that job losses in the coal industry are easily accommodated by retirements and that many more jobs will be created in renewable energy.

References

Ansolabehere S et al. (2007) *The Future of Coal: An interdisciplinary MIT study*, Massachusetts Institute of Technology, Cambridge MA, <http://web.mit.edu/coal>, accessed 11/6/2007.

Diesendorf M (2007a) *Greenhouse Solutions with Sustainable Energy*. UNSW Press, Sydney.
Fallacies about wind power, including the fallacy that large-scale wind power cannot provide base-load power, are discussed in more detail in Chapter 6. Nuclear power is demystified in Chapter 12 and coal with CCS in Chapter 11. Some of the fallacies about greenhouse science, disseminated by contrarians, are refuted in Chapter 2.

Diesendorf M (2007b) *The Base-Load Fallacy*. Briefing Paper No. 16, <www.energyscience.org.au>.
Refutes the fallacy that renewable sources of electricity cannot provide base-load power.

Diesendorf M (2007c) *Paths to a Low-Carbon Future: Reducing Australia's Greenhouse Gas Emissions by 30 per cent by 2020.* <www.ies.unsw.edu.au>, go to News and Events page. Shows that it is possible to reduce Australia's greenhouse gas emissions to 30 per cent below the 1990 level by 2020, based almost entirely on commercially available technologies, given the political will.

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Wilkenfeld G, Hamilton C & Saddler H (2007) *'Clean coal' and other greenhouse myths.* <www.tai.org.au>, August.
This is a valuable paper, but I do not agree entirely with answers to its Myths 4, 5, 11 and 12.

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About the Author

Dr Mark Diesendorf teaches and researches ecologically sustainable deelopment and greehouse solututions at the Institute of Environmental Studies, University of New South Wales. Previously he has been a Principal Research Scientist in CSIRO, Professor of Environmental Science at University of Technology Sydney, Vice-President of the Australia New Zealand Society for Ecological Economics and Director of Sustainability Centre Pty Ltd. His latest book "Greenhouse Solutions with Sustainable Energy", was published by UNSW Press in 2007.
Contact: (02) 9385 5707 <m.diesendorf@unsw.edu.au>
(alternate phone contacts via Jim Green 0417 318 368)

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Contact contributors to this Briefing Paper via Jim Green <jim.green@foe.org.au>, 0417 318 368.