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A PRESENTATION BY

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Can wind power earn a place in Australia's energy future?

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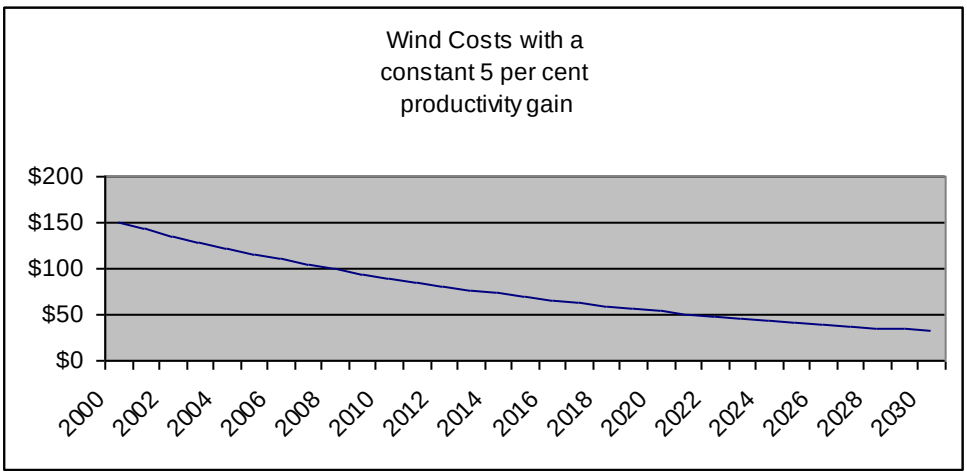
The Costs of Wind and Other Energy Sources

Wikipedia tells us that wind power has a 5,500 year history. It has clearly stood a test of time and it would be folly to suggest it has no place in our energy future.

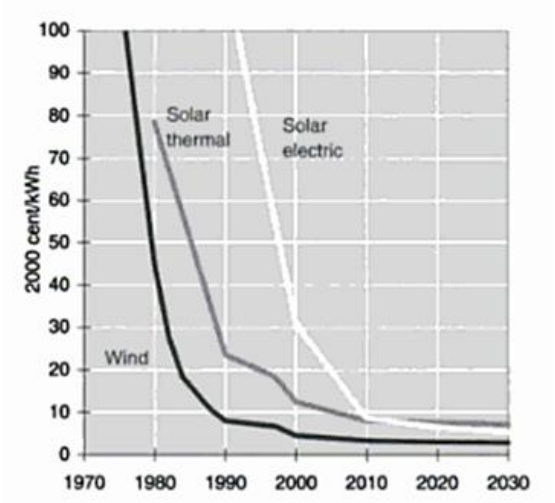
It has an established role in pleasure sailing and driving remote farm pumps. Beyond such boutique areas, however, its success depends on it becoming economic with other power sources or, as is presently the case, enjoying political patronage that catapults it beyond any of its competitive economic deficiencies. This *commands* rather than *earns* a place for wind.

Much has been made of the apparent apostasy of Bjorn Lomborg who has called global warming a danger to the world and has looked to major subsidies be allocated to R&D for wind and other renewables. Lomborg's 2001 book, *The Skeptical Environmentalist*, was seen as a pantheon of anti-warmism.

But in that book Lomborg was actually forecasting wind's competitiveness by 2030. He pointed out that windmill productivity had increased by 5 per cent a year since 1980. If maintained, this would look like a $32 per MWh cost by 2030 – competitive with existing sources if it is assumed that those sources showed no technological improvement.



Lomborg's view was informed by the US Department of Energy which had made the following cost forecast in 1999.



But by 2006 a more hardnosed approach to wind's costs was being promoted. Forecasters had begun to realise that a new technology often experiences rapid gains in its economics but these tend to taper off

Our very own CSIRO showed the following assessment of the economics

Levelised energy costs for different generation technologies in Australian Dollars (2006)

Technology	Cost (AUD/MWh)
Nuclear (to COTS plan)	40–70
Nuclear (to suit site; typical)	75–105
Coal	28–38
Coal: IGCC + CCS	53–98
Coal: supercritical pulverized + CCS	64–106
Open-cycle Gas Turbine	101
Hot fractured rocks	89
Gas: combined cycle	37–54
Gas: combined cycle + CCS	53–93
Small Hydro power	55
Wind power: high capacity factor	63
Solar thermal	85
Biomass	88
Photovoltaics	120

Source: Graham, P. The heat is on: the future of energy in Australia CSIRO, 2006

Even "high capacity factor" wind remained twice the cost of coal. And in practice the cost of wind is more like $100 per MWh rather than the stylised $63 suggested.

Perhaps recognizing that statistical projections are not quite as immutable as he once thought, two years ago Lomborg was calling for a tax on energy so that research funding could be funneled to wind and other exotic sources. Solar power in any of its exotic forms – solar collectors, tidal, biomass, and wind - is costly almost

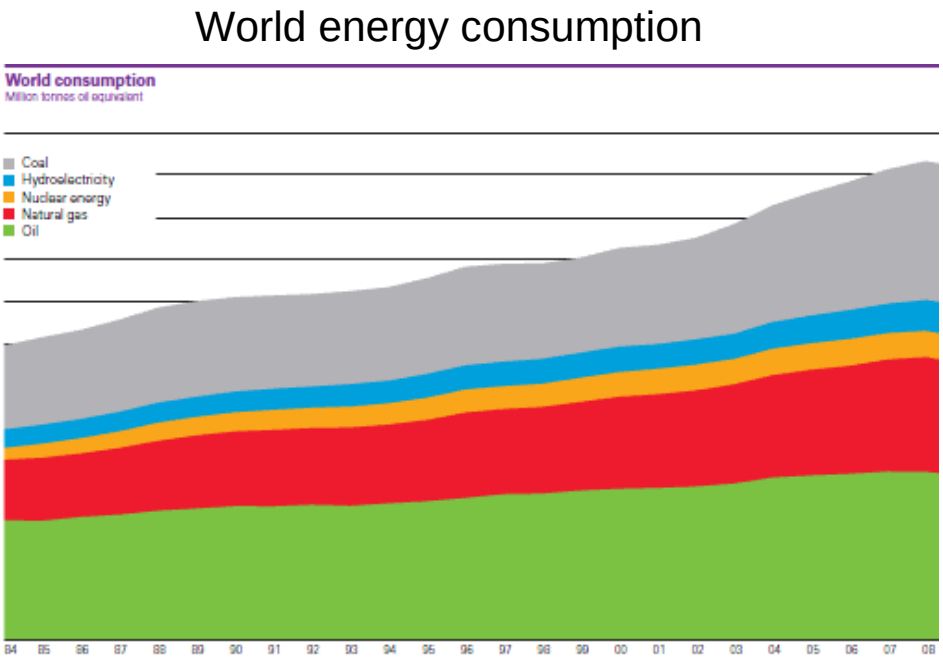
everywhere against fossil fuels. Fossil fuels represent solar fuels that have been compacted and concentrated during the billions of years they have been inside the earth's crust. The natural energy falling on the earth directly or indirectly from the sun must always be more diffuse than this and human induced acceleration of the process of compaction has to compete with these geological time forces.

It is unlikely that any form of contemporarily delivered solar power can by competitive on a growing scale. Exceptions where solar power can be competitive are

- some remote locations where solar might be more competitive than oil at least for some of the time
- special situations and where biomass is a bi-product, as in the case of bagasse, but not in the case of plants grown specifically for ethanol
- and hydro power, where rapid compaction is carried out by the earth's topography, but where a great many of the global opportunities have already been taken up and where opposition is strong to any further expansion.

World Energy Trends

The world's overall energy profile is shifting at a glacial pace in spite of the many government regulatory interventions.



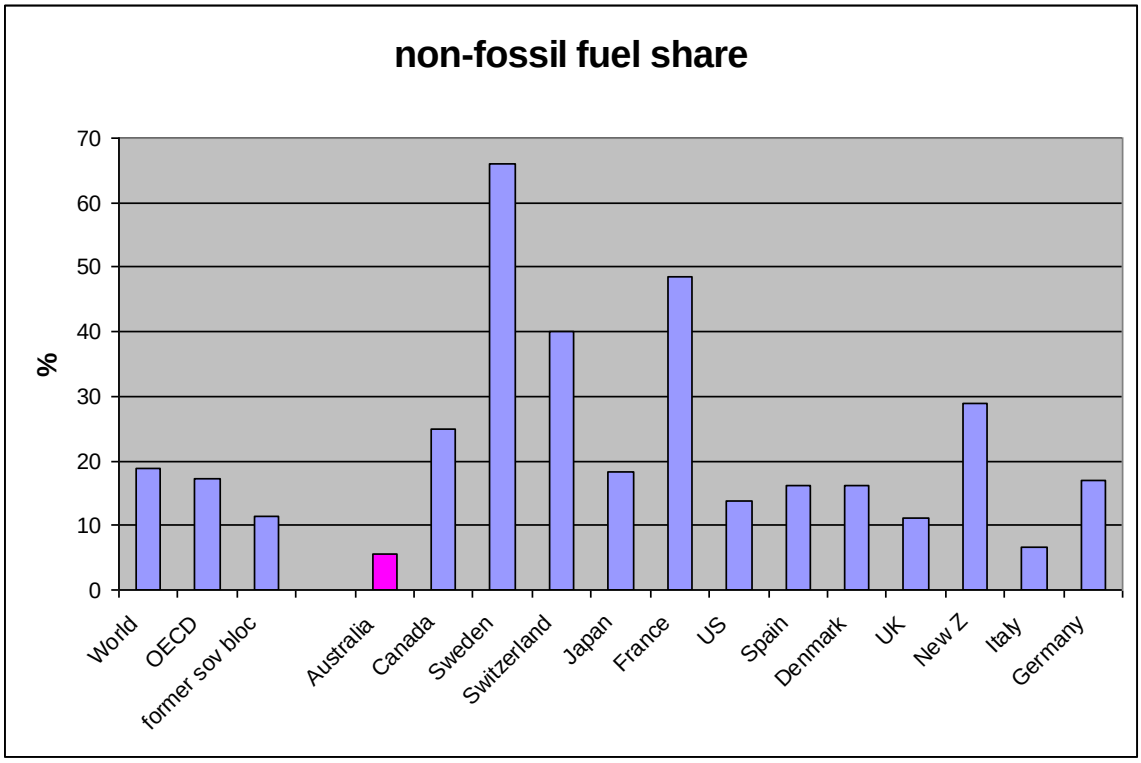
Hydro is the only solar based power presently in major use globally and accounts for about 6 per cent of the total. Nuclear's share is a little less and the rest is fossil fuels.

For renewable electricity, Spain is the star with 12 per cent of their electricity supplied by wind. But, as Gabriel Alvarez of King Juan Carlos University demonstrates, there is a penalty involved. As a result of the higher costs of wind, 2.2 jobs are lost for every one created; each wind industry job has a cost of €1 million. Spain has recently considerably reduced its wind subsidies including retrospectively

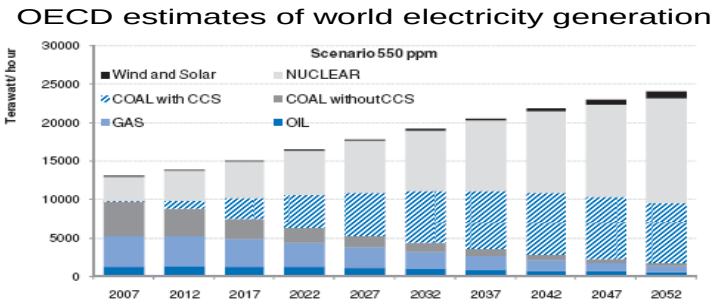
on existing facilities. Wind in Germany is over 6 per cent (Denmark is higher but is not an electrical entity), the US is under 2 per cent and China less than one per cent.

Wind in Australia's Future Energy Profile

Australia has just about the highest reliance on fossil fuels of any country in the world. Only 5 per cent of energy in Australia comes from other sources. Most other countries have some nuclear power as well as hydro.

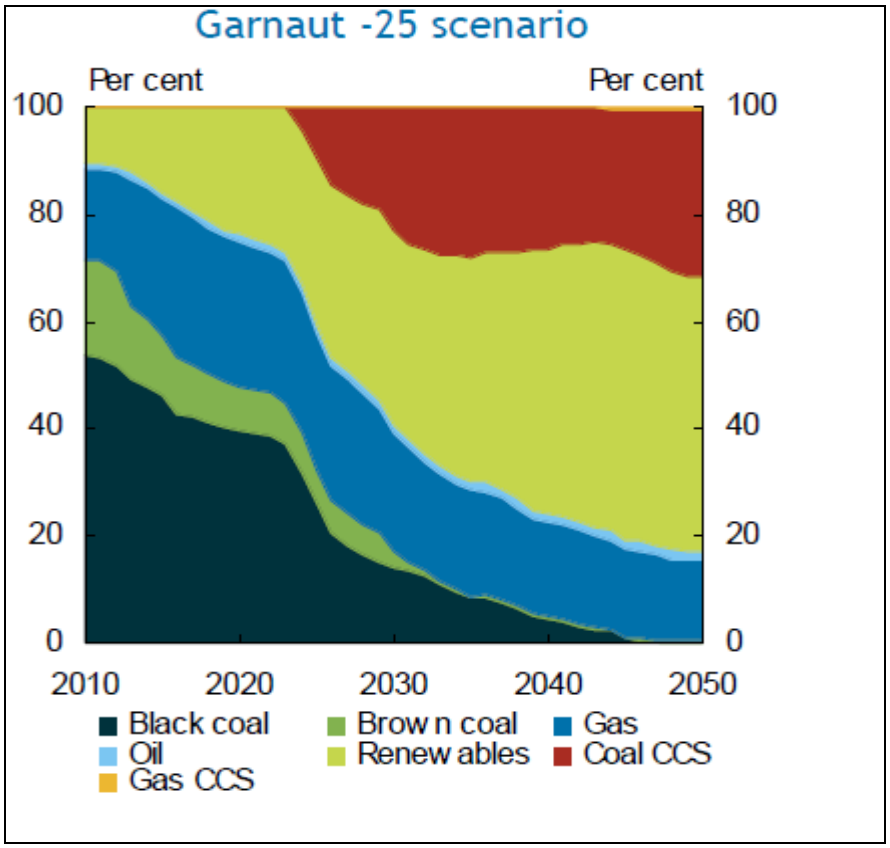


In a carbon constrained future, the OECD sees very little role for solar and wind in its projections. It envisages that the taxes to defray emissions will drive Carbon Capture and Storage as well as a larger share for nuclear. Wind and solar is put as increasing little from its present one per cent share.



Source: OECD, The economics of climate change mitigation, policies and options for global action beyond 2012

Australian forecasts are in contrast to this in that they foresee a solar future as Treasury, which was constrained from including nuclear. This Treasury projection, the Garnaut 25 scenario of stabilisation at 450ppm, is like other Treasury estimates highly optimistic but still involves a near tripling of the real electricity price. The scenario has wind at over 50 per cent, and CCS coal at 30 per cent.



In spite of forcing a revolution to high cost energy supply sources, Treasury forecasts a loss of GDP of only a few per cent in the context of an underlying growth of over 70 per cent. But this rosy scenario is driven by applying pollyana-ish assumptions about substitution of other expenditures for current energy spending and some heroic conjectures about new technologies.

The only experience we have of a product facing the same sort of forced price increases required to abate carbon dioxide was during the 1970s, when the price of crude oil quadrupled. This caused considerable economic dislocation but adjustments were made by finding ways to economise on oil. These included substitutions by coal and natural gas and nuclear. The higher prices also brought energy savings and increased oil discoveries.

But a tax on carbon is far wider than this. Few offsetting effects are available. None in reality, outside of a wholesale move to nuclear.

It is sometimes said that energy is only 5 per cent of GDP and much of that is in the delivery system, hence the effect cannot be great. But we could say the same thing about food which is only about 12 per cent of GDP and much the greater part of this is

non-nutritious value added and transport. Clearly if we reduced food supply by 80 per cent, as is proposed for carbon dioxide emissions, there would be mass starvation.

In order to accommodate energy needs in the near carbonless world, economic modellers have to make forecasts about new sources of energy. But these are blind guesses. CCS is presently unavailable anywhere even in pilot form. Wind has ceased to enjoy its former promise of endless cost reductions and seems destined to remain three times the cost of coal and given its intrinsic unreliability ahs a ceiling on the share it can realistically supply.

It may well be that dramatic new developments in power generation are around the corner but these have been foreshadowed for over a decade without them having materialised, in spite of vast subsidies to R&D and the prospect of major commercial gains.

Wind cannot on our present understanding be anything other than a high cost niche energy source. But energy policy is creating a risk that prevents commercial firms from investing in carbon based plant. The regulatory sword of Damocles hanging over the heads of energy generation businesses and large energy users has constrained investment over the years – no major new power station has been commenced since 2002 anywhere in Australia. Australia is far more vulnerable to being forced to adopt wind power than other economies because much of our competitive advantage is built on us having the lowest cost electricity generation in the world. We are deliberately denying ourselves this asset and we will be the poorer for it.