

21 April 2008

Submission to Garnaut Review
Garnaut Climate Change Review Secretariat
Level 2, 1 Treasury Place
East Melbourne Victoria 3002

Dear Professor Garnaut

The following suggestions largely relate to the engineering measures that may be needed to achieve deep cuts to Australia's emissions

- Australia has very large potential sources of energy available to it from sunlight, wind and hot rocks, all virtually emission-free.
- A major problem is the destabilising effect of fluctuating energy sources on the extended high voltage alternating current transmission system which currently supplies most of eastern Australia and SA.
- One possibility is the conversion of the major interconnectors to direct current transmission, thus reducing the destabilising effects of interconnection. The US and Canada apparently have four unsynchronised regions – East, West, Texas and Quebec. Direct current lines are being used for up to 1700 kms, voltages up to 800KW, and power loads up to 3000MW. Energy losses are about 3% per 1000 kms. Machinery to convert from AC to DC and back again is costly, but above about 700kms the lower cost of the transmission lines apparently outweighs the cost of the machinery (<http://wikipedia.org/wiki/HVDC> 21/4/08). Conversion of our existing interconnectors to direct current would increase their capacity. Direct current lines could be used to bring power from hot rock sources.
- More research and development is needed on ways to store energy from transient sources such as wind and sunlight, so that a higher proportion of energy consumption can come from such sources.
- High temperature solar thermal systems are evolving rapidly, increasing in size and decreasing in cost. A 65 MW system, built in 16 months at a cost over \$250m, began operation in Nevada in June 2007. A 533 MW HTST system is due for completion in the Mojave desert in California in 2011. (from a Wyld Group discussion paper “High temperature solar thermal (HTST) technologies, market potential and innovation opportunities”, www.wyldgroup.com.au). A 154MW high temperature photovoltaic solar system is to be built in north-western Victoria, for an estimated cost of \$420m, and is due for completion in 2013 (www.solarsystems.com.au/154MWVictorianProject.html).
- A 22/9/07 analysis by McLennan Magasanik Associates, attached to the Wyld Group discussion paper, estimated the capital cost of high temperature solar without storage as \$2.8m/MW, and \$4.76m/MW with storage. They estimated long run marginal costs as the present value of the capital, fuel and operating

costs, divided by the present value of the output over the expected life of the plant. For a high temperature solar plant near Port Augusta in SA, they estimated a long run marginal cost of \$91/MWh without storage, and \$86 with storage. They commented that carbon prices around \$50/tCO_{2e} were likely to see HTST technologies being economic relative to other new generation options. Given recent construction cost increases, these price estimates are likely to be too low.

- Gas pipelines in eastern Australia, given their limited supply sources and undesirable leakages, may need to be phased out, with electricity replacing gas for most applications. Some households and industry would need transitional assistance.
- Unless power can be supplied from clean sources, desalination plants will make Australia's achievement of deep emission cuts even more difficult.
- Carbon sequestration from coal power stations requires costly capture plant, pipelines and wells, has safety issues and substantial residual emissions, and appears unlikely to be available before 2020. Carbon sequestration may only be a minor and temporary expedient on the path to a much greener Australia.
- Present coal power stations will have a vital role in continuing to meet power demand as other technology evolves. Their owners may need to be given incentives to continue operating until replacement sources are available and reliable.
- The national electricity market is sometimes stressed by very hot days, with increased use of air-conditioning. Such days are generally both windy and sunny, making wind and solar sources useful. But tariff arrangements for retail consumers need to be made much more flexible, so that consumers are charged a price related to the wholesale spot price, and have much more incentive to use less power when prices are high.

Yours sincerely

Richard Cumpston