

Energy in a Changing Climate

Mix calls for nuclear genie touch

The Intergovernmental Panel on Climate Change in its Fourth Assessment Report, sees the OECD's future electricity fuel mix somewhat differently to most environmentalists and possibly the Australian Government.

The IPCC sees 47 per cent of electricity in member countries of the Organisation for Economic Co-operation and Development still coming from fossil fuels (coal, oil and gas) by 2030, and only 11 per cent from the new renewables (wind, solar and geothermal). The balance would be made up of 24 per cent nuclear, 14 per cent hydro and 4 per cent biomass. Environmentalists have been very supportive of the IPCC in terms of emission reduction targets, yet they have been keen to get rid of fossil fuels and nuclear power as quickly as possible and replace them with renewable energy.

So is the IPCC realistic with its fuel mix forecast?

In Australia, coal plants provide most of our base-load power - that needed to meet minimum expected demand. It can be 70 to 80 per cent of the total required to supply industry, commercial and residential demand.

To use wind and possibly concentrated solar power (CSP) to replace existing coal power plants we need some way of storing the excess electricity generated during periods of good winds or sunshine for use in periods of inadequate power created by wide-area wind calms or cloudy days.

The only proven technology to do this on the gigawatt scale needed is pumped storage where surplus electricity is used to pump water from a lower reservoir to a higher reservoir. When there is an electricity shortage, the water can be released back into the lower reservoir through a hydro-electric plant. Given Australia's water supply problems, it seems unlikely that we will build more hydro dams or new large pumped storage systems.

The CSP industry is working on ways of storing surplus heat to generate electricity during the night or on cloudy days. So far only small plants with eight hours of storage have been demonstrated. Even if this energy storage problem was solved it would take about 8,000 wind turbines or 400 sq kilometres of CSP collectors just to replace the Latrobe Valley brown coal power plants.

The other new renewable, geothermal, doesn't have the same need for energy storage. Unfortunately, we don't have the conventional geothermal hot water reservoirs in Australia used in the US, China and Iceland and the engineered geothermal systems being developed in the Cooper Basin may take a few more years before we see a significant quantity of base-load power.

Meanwhile nuclear power, seen by the IPCC as the largest contributor to OECD low-carbon electricity by 2030, appears to be still off the Australian agenda. I doubt we will be closing the coal-fired power stations any time soon. But if we can't get carbon capture and storage (CCS) to work cost effectively we may just have to face the nuclear genie. Even the IPCC sees only 30 per cent of coal plant capacity using CCS by 2030.

It's a pity that those that so readily accept what the IPCC scientists say about the dangers of climate change ignore what they say about mitigation solutions for electricity generation. Renewables are not a short-term replacement for fossil fuels and it may take decades before they are.

Written by Martin Nicholson and first published in The Financial Review 30 July 2008