Energy in a Changing Climate

Dash for Gas

With Copenhagen been and gone and emissions trading in Australia all but dead and buried, now might be a good time for a reality check on emissions abatement. The science of global warming might be challenged but it is far from dead. Action to reduce emissions is still needed.

What did come out of Copenhagen was a commitment by developed countries to limit warming to two degrees. Various emission abatement targets have been bandied about but there seems to be some consensus around a 25% reduction by 2020 and 80% by 2050 for developed countries as a minimum to achieve the two degree limit. What would it take to achieve that in Australia – irrespective of the market mechanism?

Most of our emissions come from the energy sector and the biggest culprit is electricity generation. Emissions abatement in Australia means moving to clean energy and particularly clean electricity. Market mechanisms encourage clean energy but they don't create it. That is a role for technology. So let's look at electricity generating technology with a view to moving to clean electricity.

90% of electricity emissions come from burning coal. Shut down the coal plants and our clean electricity problem is solved. The first technology challenge is deciding what to replace the coal plants with. Whatever we use must be a reliable source of power. Electricity is not like water. Storing electricity is possible but expensive so it has to be made in the right quantity at exactly the time we use it. Coal power stations are the engine room of our electricity network. They keep the network running smoothly while hydro and gas plants are turned on and off to handle the changing demand through the day. An unreliable network means disrupting factories, offices, homes and public transport with significant loss in productivity and services.

The "dash for gas" looks like the simple solution. Gas is a ready substitute for coal as far as the electricity network is concerned. Australia is blessed with plenty of gas supply but we might need to cut back on exports. Replacing coal with gas will be expensive and will cost some coal miners their jobs but is eminently doable. TRUenergy already has such a proposal for its brown coal plant in Yallourn in Victoria. But will a dash for gas deliver us the abatement targets we need?

Unfortunately the answer is no.

Two things count against it. First, according to Treasury, our demand for electricity will grow by 7% by 2020 and 38% by 2050. All those extra people will consume more electricity even with substantial improvements in efficiency. Second, gas still produces emissions - about half the emissions of black coal and a third the emissions of brown coal. Even if it were possible to replace all the brown coal with gas by 2020 we would still miss the 25%

reduction target by 40%. The 2050 goal is impossible even with all the coal, both brown and black, gone.

So what are the alternatives?

Variable sources like wind and solar PV really need bulk energy storage if they are to replace coal. Hydro systems deliver bulk storage but with Australia's water resources they are not a realistic option in the scale needed. We would probably need to replicate Sydney's entire reservoir system and dedicate it wholly to storage just to cover our current power demand. We can't siphon the water off for drinking. Conservationists oppose new reservoirs and there doesn't seem to be many other attractive bulk storage options with sufficient potential.

Solar with heat storage is a possible option but no one has yet built a round-the-clock solar system without using gas. Geothermal using hot rocks might be an option but it's still under development and not yet a proven technology. Biomass needs hundreds of thousands of hectares of arable land to run just one large power station. All these solution may have some place in the future but it is difficult to see them replacing all the coal plants.

There is really only one clean energy technology that can reliably and efficiently replace coal plants and deliver the kind of abatement we need to achieve the two degree limit. That is nuclear power.

The type of nuclear plants that are being installed in China and Korea today can do the job. Five 1.5 gigawatt nuclear plants built here over the next 15 years could replace all the brown coal first and reduce emissions by 25% by 2025. A further 27 nuclear plants by 2050 could supply all the power we need for our expanded population and reduce emissions by more than the targeted 80% reduction. Nuclear will actually be cheaper than gas once we have a price on carbon and cheaper than solar thermal.

Britain tried the dash for gas in the 1990s. They also built plenty of wind farms both on and off shore (solar isn't really an option in the UK as anyone – like me – who has lived there will tell you) but they realised gas wasn't going to get them to the abatement targets they needed. They now plan to build 10 more nuclear power plants – something that seems to be off the agenda here – and needs to be put back on!

Written by Martin Nicholson and first published on ABC Environment 12 February 2010