Greenhouse implications of the proposed Sydney desalination plant

Australia Institute Webpaper July 2005

The Carr Government has announced that it will build a desalination plant to help resolve the water supply shortage, unless there is enough rain in the next few months to raise storage levels to some unspecified 'safe' value.

Desalination is an energy intensive process. Because electricity in eastern Australia is mostly generated by coal-fired power stations the energy used in the proposed plant will result in high levels of greenhouse gas emissions. This paper contains some estimates of the energy use and greenhouse gas emissions of the proposal.

The proposed desalination plant can be built in stages and is expected to have a maximum output of 500,000 kilolitres (kl) per day, or 182,500,000 kl per annum. The table shows the stages in estimating greenhouse gas emissions from the new plant operating at maximum output.

Electricity consumption while in operation	120 MW
Annual electricity consumption	900 GWh
Energy intensity of water production	4.93 kWh/kl
Approximate greenhouse emissions per kWh delivered in NSW, with current generation fuel mix (a)	1.05 kg CO_2-e/kWh
Greenhouse gas intensity of water produced with current generation fuel mix	5.2 kg CO_2-e/kl
Annual greenhouse emissions, with current generation fuel mix	945,000 tonnes CO_2-e

a. Australian Greenhouse Office *Factors and Methods Workbook* 2004

Annual electricity use in NSW is about 60,000 GWh, so the proposed plant would increase the State's electricity use by 1.5 per cent (and Sydney's electricity use by more than 2 per cent).

The emissions are the equivalent of putting another 220,000 cars on the road, or burning 2 litres of petrol for every 1,000 litre of water.

Where will this additional electricity come from? The constant energy use of the plant will means that it will increase the demand on base-load power stations, and will result in the burning of more coal than would otherwise be the case.

Contrary to the suggestions of Sydney Water, the NSW Greenhouse Gas Abatement Scheme will make no difference to the state's greenhouse gas emissions if the desalination plant is built. The scheme operates through the creation and surrender of accounting instruments called NSW Greenhouse Abatement Certificates (NGACs). These can be created from a wide range of 'greenhouse reduction' measures including renewable energy generation, gas-fired generation, energy efficiency and carbon sequestration (planting trees). NGACs can even be created by the most polluting power stations in Australia − the brown coal generators in Victoria – if they can make a case that they are less polluting than they might be!

Despite these very forgiving rules, there will probably not be enough NGACS to offset the normal growth in NSW electricity demand, let alone the additional needs of the desalination plant. The increased demand for NGACS generated by the operation of the desalination plant will mean that electricity suppliers will probably pay fines (to the government) for failure to secure enough NGACs. So the desalination plant will result in more revenue *and* increasing greenhouse emissions.

The only way the NSW Government could guarantee that the plant would not add to greenhouse gas emissions would be to set up a quarantined renewable energy scheme, equivalent to the Commonwealth Mandatory Renewable Electricity Target (MRET). The latter values CO_2 emissions at about $40 per tonne. This would have the effect of increasing the annual demand for renewable electricity (currently capped at 9,500 GWh under MRET) by about 10 per cent. This would add around 4c/kWh to the cost of electricity generation, which in turn would add around 20c to the cost of each kilolitre of desalinated water, making the cost of electricity to the desalination plant about 50c per kilolitre in total.

At the reported construction cost of $2 billion, the annual interest alone (at 6 per cent) would be $120 million or 65c per kilolitre. With capital repayments and profits to the private developers and other outgoings apart from electricity, the total charges could easily top $1.00 per kilolitre.

Therefore a greenhouse-neutral desalination plant would produce water at about $1.50 per kilolitre more than the current supply from conventional sources. Following an IPART determination, from October 2005 the marginal price of water in Sydney (for household consumption above 400 kilolitres per year) will be $1.44 per kilolitre (with a price of $1.13 per kilolitre for those who consume the average of 250 kilolitres of water each year).

With IPART's shift towards pricing water at its marginal cost price, the desalination plant would result in water being priced to high-volume household users at around $3.00 per kilolitre, or double the post-October price (and treble the current price). A marginal price of about $3 per kilolitre for usage above the household average of 250 kilolitre per year would for the first time signal the actual cost of high water use.

It would also be prudent for the NSW government to commit to building no more coal-fired power stations, so that if the desalination plant has to be built, then at least

its massive electricity demand will be met by less polluting generation, if not by renewable energy then at least natural gas. Any talk of 'carbon offsets' is simply a smokescreen to hide the plant's true environmental impact.

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