Garnaut Review Submission - Transport, Planning and the Built Environment

Solar Armidale Group

Reducing greenhouse emissions from buildings

Prof Andrew Blackers, Director of the Centre for Sustainable Energy Systems, ANU, reports that mass retrofitting of buildings is the only way to achieve rapid reductions in greenhouse gas emissions from buildings.

Emissions trading system (ETS) can fund proven emissions-reduction technology such as insulating homes and installing energy-efficient light bulbs. Ideally, ETS will transform power-generation companies into energy providers who offer energy audits and loans for retrofitting to be repaid from the savings in energy costs and greenhouse emissions.

But it will be more sensible to fund research and development for unproven technology from the revenue raised by auctioning emissions permits. Currently, many promising ways to reduce greenhouse emissions are not in use because there has been little interest in developing cost-effective systems, e.g. a solar-thermal heating system that could be mass produced for the colder climates where it is most needed (see Appendix – potential benefits of solar heating).

It might also be necessary to stimulate interest in retrofitting by providing funding for demonstration projects advertising the benefits of improved energy efficiency in existing buildings. One simple, cost-effective idea would be to publish an on-line manual describing the benefits and costs of different ways to retrofit insulation and as well as other important efficiency measures. We also need to investigate whether current methods can be improved. For example, there are machines to blow shredded insulation into walls, but their wide nozzles still require several weatherboards to be removed, so the process is very difficult, labour-intensive and hence expensive, sometimes prohibitively so. Could a machine be developed to install insulation without removing as many weatherboards?

Despite claims in the firewood industry submission, domestic wood heaters are not a viable option for reducing greenhouse gas emissions. A draft 197-page report by a UK committee of experts shows that the health effects of air pollution are worse than previously thought - our best estimate is that death rates increase by 6% for every 10 ug/m3 of PM2.5 pollution.[1] There is strong evidence that fine particle pollution is causing the increased death and illness rates – when cities reduce PM2.5 pollution, death rates and respiratory illnesses fall substantially.[2] In 2006, Sydneysiders were horrified by reports that up to 1400 Sydneysiders dying prematurely of air pollution.[3] The latest research showing the effect of PM2.5 is worse than previously thought suggests that the true figure may be closer to 2,000. With estimated health costs of $132 for every kg of PM2.5 emitted to Sydney's air,[4] and the average new woodheater emitting 14-28 kg of PM2.5 per year, estimated health costs of using a woodheater in Sydney are at least $2000 per year,[5] a figure that massively outweighs the estimated reduction from using woodheating of at most 1 tonne of CO2-eq per year.

There are far cheaper and less health-hazardous ways of reducing greenhouse gas emissions than woodheaters. Nearly all modern power stations (which are equipped with fabric or electrostatic filters to trap harmful PM2.5) can burn 5-10% wood without modification. It is to be hoped that the ETS will provide a sufficient incentive for all the fuel wood we can grow sustainably to be used to replace coal in power stations.

For similar reasons, it may be inadvisable to encourage the use of diesel vehicles until more stringent emission standards are in place. The emissions limit for a new Euro-4 diesel car is 0.025 g/km, about 2.5 times worse than the average petrol car. Emissions of 6-year old Euro-4 diesel may also be higher than when the car was new. A high proportion of car trips are 1-person trips of short duration. It would be far better to encourage use of bicycles, or lighter, more fuel-efficient vehicles for such trips than risk people's health from increased use of diesels, even ones that satisfy Euro-4.

Although ETS provide a useful incentive to reduce greenhouse emissions, regulation is often required to ensure success. For example, in colder climates such as Armidale, NSW, where the average woodheater user burns 4 tonnes of wood per year, creating a very serious pollution problem,[6] 47% of new houses built in 1992 had no ceiling insulation other than reflective foil and 67% had no wall

insulation other than foil. Despite the large savings and increased comfort from living in an insulated house, market forces were unable to deliver. This could be why countries such as the UK passed legislation decades ago to require all new houses to have an adequate level of insulation. Even in NSW a certain level of energy efficiency is now required under BASIX.

Regulations could also help address the inadequate level of insulation in existing houses by requiring energy efficiency audits when houses are sold, or better still requiring sub-standard houses to be retrofitted to a certain level of efficiency (e.g. 3-star) before sale.

Encouraging urban consolidation may also require additional regulations. We are all aware of stereo systems in cars where the driver hears music but people in the street hear only the 'boom boom' of the base. This is not too annoying because the noise soon passes. But when a similar system is used in a house with a concrete floor, the 'boom boom' can be heard hundreds of metres away and sounds like machine driving concrete piles into the ground. The trend towards urban consolidation may be reversed if lack of regulation means that one person can enjoy their form of music at the expense of everyone in nearby houses. The solution may be as simple as requiring some form of suspension to ensure the low-frequency sound is transmitted to the air instead of reverberating thought the ground. Other regulations might limit the base output of home theatre systems, warn purchasers about the problems of noise transmission, or require such systems to be sold with free cordless headphones.

Continuing to allow woodheaters in urban areas is also likely to increase greenhouse emissions by reducing urban consolidation. Smoke from a chimney 30 metres away can be unbearable and chimneys even further away e.g. 50 metres may prevent windows from being opened to ventilate houses and deter people from using outdoor living areas, significantly impacting on the lifestyle of nearby residents. Regulations requiring all woodheaters that emit more than 1 kg of PM2.5 per year to be removed before houses are sold (similar to the recently-enacted legislation in Rangiora and Kaiapoi, NZ[7]) will also help prevent a reversal of urban consolidation.

Appendix – potential benefits of solar heating

Although the concept of solar heating has been known for years, there are no cost-effective systems on the market for use in colder areas. The costs of developing such a system would be very modest, compared with the cost.

Armidale often enjoys fine and sunny days in winter, has a great climate for solar heating.

Unlike photovoltaic systems which have high cost and relatively low efficiency, solar home heaters could cost less than $3,000 and generate savings of 6 megawatt hours per heater per year, so 100 heaters could save 600 megawatt hours annually. If 1,000 heaters are installed over the next 10 years, the savings could eventually exceed 6 gigawatt hours per year.

Solar heaters use the sun's rays shining through a transparent cover to heat a narrow airspace on the roof. The warm air is then circulated into the building by a small fan. The solar heater in the picture was constructed for less than $1,000 dollars and, even in Melbourne's much colder climate, halved the heating bills – a great result according to the owner.

Solar heating provides a real opportunity for a clean, cheap, environmentally friendly alternative. Every day, 25 times as much solar energy falls on Australia as we use in an entire year. By making better use of this free source of heat, we'd reduce the damage woodsmoke has been found to cause to our health. Dr Michael Aizen of the AMA stated that "*We know that with domestic air pollution at the moment we see between eight and 17 excess deaths a year in Launceston directly attributable to domestic wood smoke heating*" *

Increased awareness of these health effects motivated residents of Launceston to halve the number of woodheaters and so halve its pollution levels. Armidale has a similar health problem and could solve it, at a much lower cost than the $2 million woodheater replacement program in Launceston, by stimulating a solar heating industry. We would also reduce the damage to our wildlife deprived by firewood collection of hollow logs for homes, and reduce our greenhouse gas emissions so helping prevent climate change.

Solar heating is the way of the future. There's no pollution, no greenhouse gas emissions, and the energy is free!

A Solar Armidale Project could achieve this vision of greenhouse gas emissions and the creation a cleaner, healthier, sustainable Armidale.

For info on the potential for solar heating see the Solar Armidale webpage http://www.3sc.net/solarm/

* 7:30 Report interview, transcript at http://www.abc.net.au/7.30/content/2007/s1895040.htm

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