Natural Resource Management (Climate Change) Inquiry

Summary

The NRMCC Committee should consider the benefits of promoting the development of solar heating to reduce greenhouse gas emissions, avoid health damage from woodsmoke pollution and the environmental damage from non-sustainable firewood collection.

Unlike photovoltaic systems which have high cost and relatively low efficiency, solar home heaters use the sun's rays shining through a transparent cover to heat a narrow airspace on the roof. A modest outlay (with materials costing less than $1,000) could halve heating bills and greenhouse gas emissions from a typical home.

Colder regions such as rural NSW may need home heating between April and October, so the development of a solar alternative would represent a substantial saving for the entire community and result in major health and environmental benefits. Research shows that mortality increased by up to 16% (respiratory mortality 68% higher) in areas with the highest woodsmoke pollution.

New designs are however, needed, to provide an affordable alternative to woodheaters in the cold winters of rural NSW. We call on this Committee to help the community realise these benefits.

Details

In order for NSW to manage resources sustainably, we will have to:

1) Reduce our impact on the climate by reducing greenhouse gas emissions
2) Make better use of free, sustainable resources such as solar energy
3) Reduce the effect of air pollution on our health (because it leads to increased use of resources to treat respiratory and other illness caused by pollution, as well as increased energy to run filters, airconditioners, and indoor clothes driers to mitigate the health and other effects of pollution)
4) Reduce the impact of firewood collection on wildlife, including threatened species, deprived of hollow logs for homes

Health problems from woodsmoke

Woodsmoke pollution is a major problem in many cities and towns in rural NSW, as it is in New Zealand. Research published in 2007 shows that people living in the smokiest areas of Christchurch, NZ have:

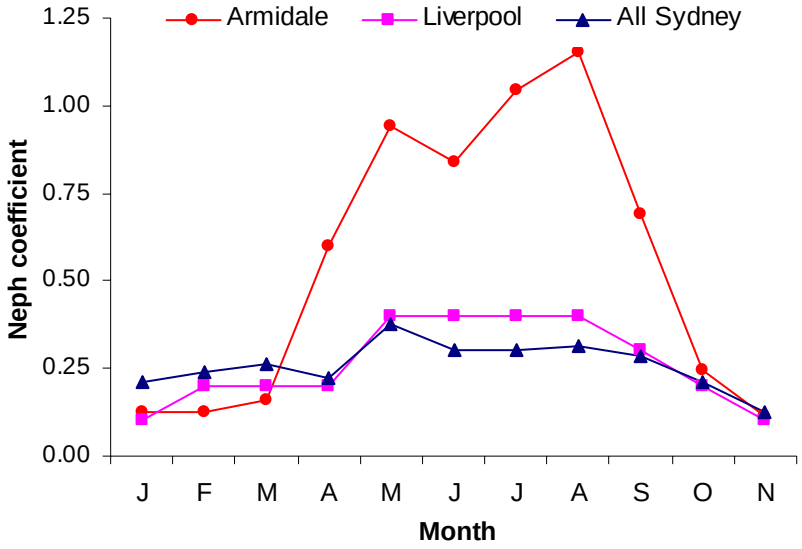
- 16% higher mortality (68% higher respiratory mortality) than people living in the least smoky areas
- estimated health costs from woodsmoke in Christchurch of more than NZ$127 million per year
- estimated health costs per heater of more than NZ$2,700 per year

Christchurch has banned the installation of all new woodheaters (except ultra-low-emission models rated < 1.0 g/kg replacing more polluting heaters). In addition, from 2008 onwards, all heaters with unacceptable pollution emissions must be removed after 15 years use (see Appendix 2 for more info).

In NZ, where woodheaters are permitted, those installed in urban areas (defined as properties less than 2 ha in size) must have much lower emissions than the current AS4013 Standard. Unfortunately, it has not been possible to set an acceptable AS/NZ standard for woodheater emissions because Standards Australia requires a consensus among all parties (including industry bodies, in this case the AHHA which represents woodheater manufacturers).

NZ (but not Australia) has therefore set its own health-based standard. In contrast, unacceptably polluting heaters continue to be installed in Australia. Based on estimates from NZ, the health costs of a brand new heater installed in an urban area amount to thousands of dollars per year. People buying new heaters probably have no idea of the health problems caused by woodsmoke, or that woodsmoke contains the same and very similar chemicals to tobacco smoke and is associated with the same adverse health effects – respiratory and heart diseases, lung, mouth and throat cancers, middle ear infections and that the PAHs and PM2.5 in air pollution (a large proportion of which come from woodsmoke) are associated with cot deaths and genetic damage in babies.

Launceston (Tas) has successfully reduced woodsmoke pollution by halving the number of woodheaters with the help of more than $2 million in Federal Funds. However, cities in rural NSW, have had very little help and continue to suffer high pollution levels and adverse health effects. The graph, compares PM2.5 pollution (measured by nephelometer) in Sydney, as well as Liverpool (a Sydney suburb where some people use woodheaters) with Armidale, which has clearer air in summer, but much higher levels of winter pollution from woodsmoke.



The NRM Climate Change Committee should help solve this problem by:

- Encouraging (and helping find funding sources) for research projects to develop non-polluting environmentally-friendly alternatives such as solar heating
- Sponsoring government legislation requiring that all heaters installed in urban areas satisfy an emissions limit set according to the annual health cost of those emissions
- Sponsoring legislation enabling councils to raise funds for woodsmoke reduction (including responding to complaints about excessive smoke, educating the community about the health effects of woodsmoke and subsidising the removal of excessively polluting heaters) by an annual "polluter-pays" levy for all woodheaters that do no satisfy the health-based standard
- For new building banning all woodheaters with expected health costs greater than $50 per year – even this cost is unacceptable in buildings which can be designed so they don't need woodheating

Appendix 1. Reducing greenhouse gas emissions and solving air pollution problems by stimulating a solar heating industry to replace woodheaters

Armidale - which 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 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, which has substantially less solar radiation than Armidale, it 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 in 2007 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.*"* All rural cities and towns in NSW with similar levels of air pollution (including Armidale) can expect similar adverse health effects.

Increased awareness of these health effects motivated residents of Launceston to halve the number of woodheaters and so halve its pollution levels. Armidale could solve its pollution and health problems, 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! However, new designs are needed to provide an affordable alternative to woodheaters in the colder winters in rural NSW.

We therefore call on the NRM Climate Change Committee and other State Politicians to work with the Armidale Community and the instigators of the Solar Armidale Project to achieve this vision of greenhouse gas emissions and the creation a cleaner, healthier, sustainable Armidale

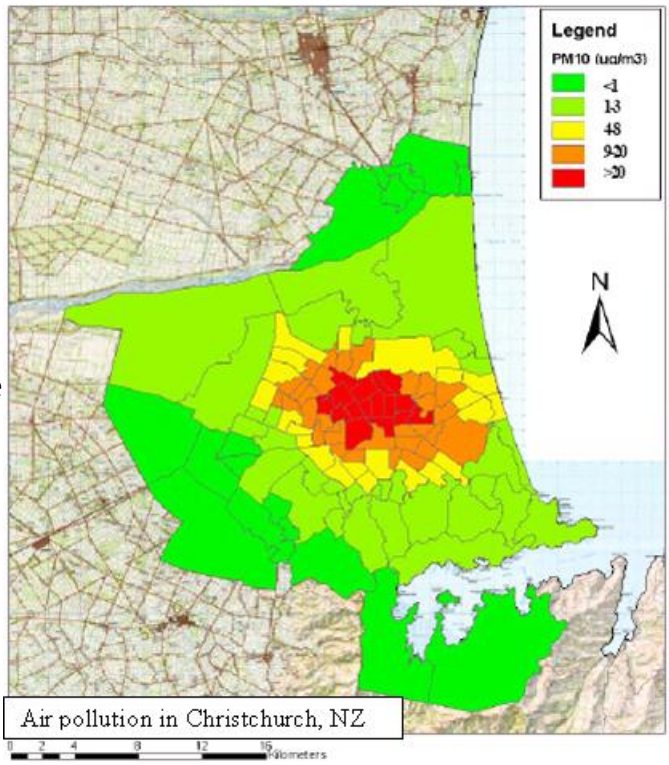
For info on the potential for solar heating see the Solar Armidale webpage http://www.3sc.net/solarm/

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

Appendix 2. Health effects of woodsmoke and what could be done (is being done elsewhere) to solve the problem

Christchurch: deaths up to 16% higher in woodsmoke polluted areas

Average PM10 pollution in Christchurch, NZ, varies from <1 µg/m^3 on the undeveloped fringes of the city to >20 µg/m^3 in residential areas with lots of chimneys (see map). More than three quarters (76%) of pollution is from woodsmoke, with only 13% from industry, 11.7% from diesel vehicles and 0.3% from petrol vehicles [1].



Up to 68% more respiratory deaths. New analyses published in 2007 show that (after adjusting for other factors such as age, sex, ethnicity, socio-economic status and tobacco smoking habits) death rates were related to smoke levels [2]. Estimates for each increase of 10µg/m^3 of PM10 exposure were:

- 34% increase in respiratory deaths
- 11% increase in circulatory deaths
- 8% increase in all deaths

This implies that living in the most polluted areas (>20µg/m^3 PM10) increases mortality by about 16% (respiratory deaths by about 68%) compared to living in unpolluted areas with <1 µg/m^3. Chemical analysis shows that woodsmoke contains the same and similar compounds to tobacco smoke, so it is not surprising that we see the same health effects, including respiratory and cardiovascular diseases. Other studies have linked woodsmoke to mouth, throat and lung cancers and PM10 pollution in general to cot deaths [3 4]. Woodsmoke contains significant quantities of polycyclic aromatic hydrocarbons (PAH). PAH from air pollution have been linked to genetic damage in babies [5].

Reducing pollution saves lives

When cities reduce their pollution, death rates fall. In 1990, Dublin reduced PM pollution by banning non-smokeless coal. There were 15.5% fewer respiratory and 10.3% fewer cardiovascular deaths in the 6 years after the ban, compared to the previous 6 years (116 fewer respiratory and 243 fewer cardiovascular deaths/year)[6].

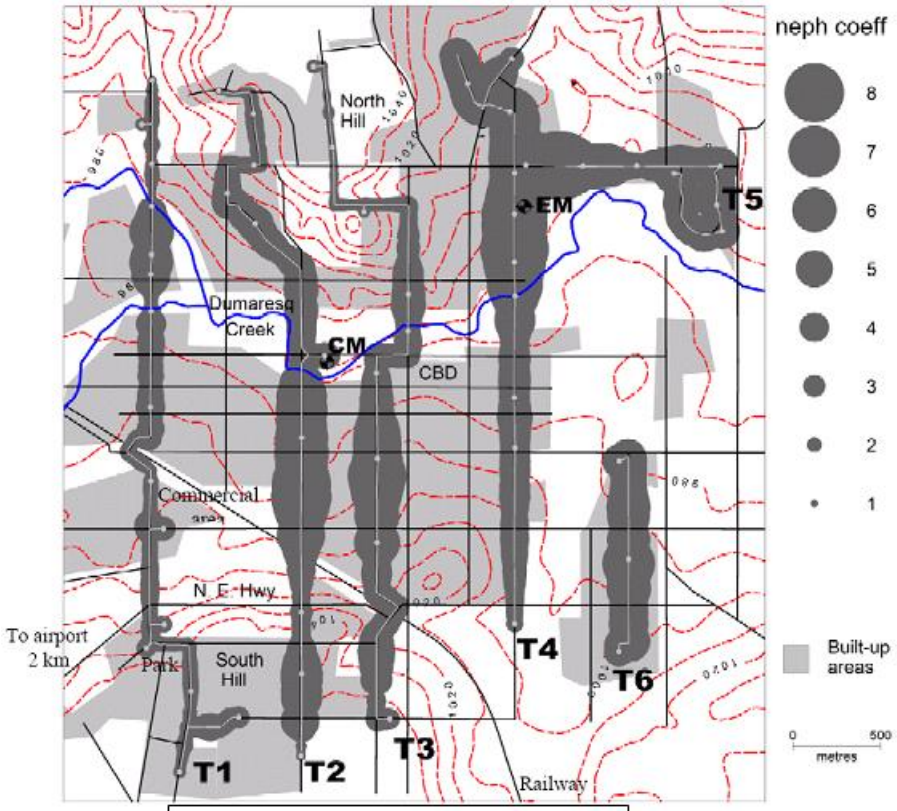
The first study to show a strong relationship between annual PM2.5 exposure and mortality was the US 'Six Cities' study. Over the next few years, pollution was reduced substantially in one city, moderately in another, remaining stable elsewhere. Death rates fell in the first two cities relative to the other four, again providing strong evidence that reducing pollution saves lives [7].

Health costs in Christchurch > NZ$2,700 per heater per year

The estimated annual health costs of woodsmoke in Christchurch exceed NZ$127 million, i.e. more than NZ$2,700 per heater per year (see references below). Christchurch has banned the installation of all new woodheaters (except ultra-low-emission models < 1.0 g/kg replacing more polluting heaters). All heaters rated > 1.0 g/kg must be removed after 15 years use (starting 2008)[1].

Armidale – similar pollution range to Christchurch

Air pollution was mapped using a mobile air pollution monitor along six routes in Armidale (labelled T1 – T6 on the map) and found to have a similar range to Christchurch[8]. Average pollution levels (neph coeff 4) correspond to about 11 µg/m^3 of pollution, or a 9% increase in mortality, if health effects are similar to those observed in Christchurch. Health effects might be expected to be twice as bad in areas with double the pollution (neph coeff 8).



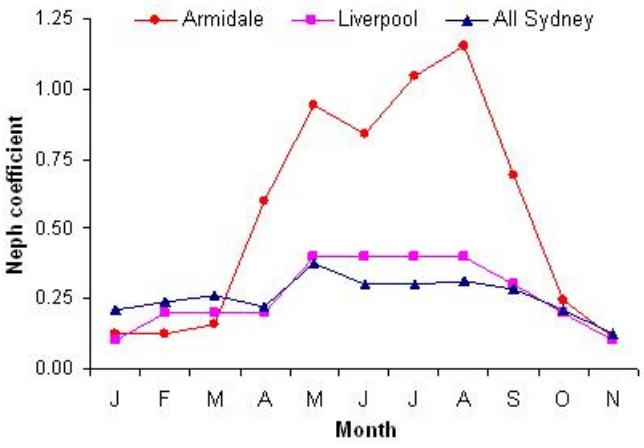
Air pollution in Armidale, NSW in 1996

Residential areas worst polluted

Woodsmoke pollution was highest in residential areas with lots of woodheaters, and lowest on the undeveloped fringes with no houses. The north end of T3 (Crest Rd, North Hill, with extensive grounds belonging to the PLC) had relatively low pollution. East Armidale was the worst area, especially around T5 (Macdonald Drive) and the north side of Taylor St (T4, near the point labelled EM). Smoke levels on the creeklands area were intermediate. There are few houses or chimneys in this area, but smoke can drain downhill into the creeklands.

Health effects in Armidale

As in Christchurch, smoke levels varied from very low on the unpolluted fringes to more than 20µg/m^3 (annual average) in East Armidale. No detailed studies of health effects have been carried out in Armidale, however a small study in 1999 found a significant correlation between woodsmoke pollution and visits to GPs for respiratory complaints. The similarity of pollution measurements suggests that we will have similar health effects to those observed in Christchurch, with similar estimated health costs – thousands of dollars per heater per year.



Comparison with Sydney

Many people think that small towns such as Armidale (and even larger cities such as Christchurch, where main source of pollution is from domestic heating) are less polluted than large metropolitan areas such as Sydney. The graph shows that this is indeed true in summer – in January, February and March, Armidale's pollution is about half that of Sydney. But as soon as people start using woodheaters in April, average monthly pollution levels rise dramatically to several times those in Sydney, even Sydney suburbs such as Liverpool where some people use woodheaters.

New heaters as polluting as older models

A recent audit of brand-new heaters found that 58% of them failed the AS4013 emissions test. One with claimed emissions of 1.8 g/kg actually emitted 17.7 g/kg, i.e. it was more polluting than the average 20-year old model. In fact, in order to emit less than 4 g/kg (the required emissions standard) woodheaters must be operated as carefully

as in the laboratory tests. Real-life emissions are much higher. When interviewed for the ABC 7:30 report, Prof John Todd commented: *"with a wood heat heater, unlike many other appliances, if you use the heater badly you can produce up to 100 times as much smoke as using it really well".* The photo shows a brand-new heater (installed in Armidale in 2006) after a few months use. The creosote stains indicate that this brand-new heater produces far more pollution than the average woodheater in Armidale. It is very poor policy (and a waste of taxpayers' money) to subsidise the removal of old heaters, but continue to allow ones that are even more polluting to be installed.

Recommendations

Like Christchurch, several councils in Sydney (including Waverley, Holroyd and Manooka Valley) have banned the installation of new woodheaters. The AMA has called for a total ban on woodheaters in the Launceston area and presumably all other cities where woodsmoke can build up. The Australian Lung Foundation, the American Lung Association and the UK DEEFRA all recommend **not using woodheaters when there are non-polluting alternatives.** All new houses in Armidale can be designed to be energy efficient and make use of passive solar energy, so that they don't need woodheaters.

Following the advice of the AMA, the ALF, the ALF, the UK DEEFRA, and in line with policies developed and adopted by health and environmental experts in Christchurch, we therefore recommend:
1) not permitting woodheaters in new buildings
2) considering whether all woodheaters emitting more than 1.0 g/kg (or better still an emissions limit that requires the annual costs of a woodheater to be less than $100 per year) should be phased out after 15 years use
3) dealing with complaints about woodsmoke promptly and effectively, so that people whose health is affected by woodsmoke are not forced to move out of the city
4) providing information on the health effects (and costs) of woodsmoke pollution to all residents

Further information and explanations

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4. Woodruff TJ, Grillo J, Schoendorf KC. The relationship between selected causes of postneonatal infant mortality and particulate air pollution in the United States. Environ Health Perspect 1997;105(6):608-12.
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6. Clancy L, Goodman P, Sinclair H, Dockery DW. Effect of air-pollution control on death rates in Dublin, Ireland: an intervention study. Lancet 2002;360(9341):1210-4.
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Submission from Dr Dorothy L Robinson,
Armidale Air Quality Group
www.3sc.net/airqual