

Dear Minister

We were all horrified to learn in 2006 that air pollution kills up to 1400 Sydneysiders every year.^[1] Even worse, the latest review of air pollution and health (published May 2008) suggests this is an under-estimate.^[2] Like its precedents, the latest review shows that PM2.5 (fine particles less than 2.5 millionth of a metre) are the pollutant most closely related to adverse health effects.

Many Australians people think cars are the worst polluters, but according to the latest emissions inventory, *woodheaters* emit a massive 4,503 tonnes of PM2.5 per year in Sydney, compared to 797 tonnes for passenger cars, 840 tonnes for light duty diesels and 681 for heavy duty diesels.^[3] Woodheaters are also the largest single source of health-hazardous PM2.5 pollution in Melbourne, Adelaide, Perth, the ACT and Hobart.^[4]

Woodsmoke, which has been described as a “*witches’ brew of carcinogens*”, contains the same and very similar chemicals to tobacco smoke.^[5] In April 2008, Dr Fay Johnston, a respiratory health researcher with the Menzies Institute stated: “*the limited amount of studies that have been done so far that have directly compared smoke from fires with the same level of particulates and smoke from car exhaust, industry have all tended to show that the effects from the wood smoke are actually worse for lung conditions than a similar amount from, say, car exhausts*” See <http://www.abc.net.au/news/stories/2008/04/24/2226672.htm>

In Christchurch, NZ (where woodsmoke accounts for 76% of PM pollution), research published in 2007 found that 10 µg/m³ of fine particle pollution increased death rates by 8%. Thus people living in the worst areas (about 20 µg/m³ pollution) had 16% higher mortality (68% higher respiratory mortality) than those in the unpolluted outer fringes of the city.^[6] There are no known thresholds below which PM2.5 pollution has no adverse health effects,^[7] so even if Australia’s air meets the NEPM standard of 8 ug/m³ PM2.5, it cannot be considered “safe”.

In 2005, a team of 25 researchers estimated the costs for NZ. They valued a year of life at NZ\$75,000 but used a lower estimate of 4.3% increased mortality per 10 ug/m³ (at the time, the standard dose-response relationship for traffic, rather than the 8% that was subsequently observed for woodsmoke). Even with this under-estimate of the increase in death rates, Christchurch’s woodsmoke was estimated to cost \$NZ127 million/year, or more than \$2,700 per woodheater per year.^[8]

In Sydney, estimated health costs (also assuming 4.3% increased mortality per 10 ug/m³) are \$132,000 per tonne of fine particle emissions,^[9] so the health costs of woodheating are \$132,000 x 4503 = \$594 million. With perhaps 130,000 woodheaters in use, this is over \$4,500 per heater per year. If these estimates had been based on the 8% increased mortality actually observed in Christchurch (instead of the 4.3% considered appropriate in 2005) the true costs of Sydney’s woodheaters would probably exceed \$8,000 per woodheater per year. The health costs of using a woodheater in other capital cities are almost as high.^[4]

Because of the adverse health effects, the Australian Medical Association, the Australian Lung Foundation, the American Lung Association and the UK DEFRA all recommend not using woodheaters when non-polluting alternatives are available.^[10] Christchurch accepted this advice and banned the installation of woodheaters in new houses and those that don’t already have them. All woodheaters in Christchurch with emissions ratings more than 1.0 g/kg must be removed after 15 years use.^[6] In Tasmania, Launceston’s Proposed Strategic Plan 2008-2013 also aims to “*Evaluate the introduction of a by-law that prevents the installation of wood heaters in homes.*”^[11]

Australia’s Environment Protection and Heritage Council’s Standing Committee decided (13 March 2008) to develop a nationally consistent approach to the management of woodheaters. We urge you as Minister to ensure that this nationally consistent approach is guided by the costs and benefits of using woodheaters.

Cost-benefit analyses led to the introduction of strict standards for diesel cars - PM2.5 were slashed by 97% – from 0.75 g/km in 1989 to at most 0.025 g/km when Euro-4 became mandatory in 2006/7.^[12] Under Euro 5 (mandatory in the EEC from September 2009), PM2.5 emissions will fall by a further 80% to 0.005 g/km, so a year’s worth of driving (20,000 km) will emit only 100 g PM2.5, comparable to emissions from a petrol car (0.01 g/km since 1985, when catalytic converters became mandatory).

In contrast, there has been little or no improvement in woodheater emissions. Woodheater expert Prof J Todd explained: “*It is Standards’ policy that any of the major stakeholders (such as industry or community representatives) can veto changes in the (Australian/NZ) standard. This makes substantive change difficult to achieve, for example changes to methods that might involve additional costs to industry.*”^[13] NZ was so concerned it set its own limit of 1.5 g/kg (62.5% less than Australia’s 4 g/kg) for all woodheaters installed in

urban areas after August 2005. This was in addition to banning new woodheaters in areas (e.g. Christchurch, Rangiora and Kaiapoi) where pollution can build up.

Only 9% of models on the Australian market satisfy the NZ standard. Expected emissions of the average new woodheater installed in Sydney are 12-24 kg of PM2.5 per year, with estimated health costs exceeding \$3,000 per year (see Appendix 1 below). There are also substantial environmental costs. Smoky woodheaters emit methane which causes 23 times as much global warming as the same amount of carbon dioxide. A recent Swedish study found that a wood boiler emitting only slightly more smoke than Australian woodheaters in simulated real-life operation caused twice as much global warming just from methane emissions as producing the same amount of heat from an oil-fired boiler (Appendix 2 below). Firewood collection can also harm the environment depriving native species (including some threatened species) of hollow logs for homes.

We therefore urge you as Minister to:

- 1) introduce a moratorium on installing new woodheaters in urban areas until a health-based standard (e.g. no more PM2.5 per year than the average new passenger car) has been set. Although many people dislike vehicle pollution, the economic benefits of cars exceed the health costs of car pollution. In contrast, the benefits of woodheaters are small compared to the cost to our health. Setting a strict standard will not only encourage new low-emission technology to be developed (e.g. heat sensors to control burning), it will encourage people living in built-up areas to follow the advice of health experts such as the AMA and the Australian Lung Foundation to use non-polluting heating (realistic gas-log heaters are almost as attractive, but produce no smoke or methane) until the new technology is available.
- 2) require all heaters that do not meet the new standard to be removed in a reasonable period of time, e.g. before houses are sold or after a certain period of use (e.g. 10 years).
- 3) introduce an effective system of dealing with the woodsmoke complaints that ratecapped local councils are unable to deal with because they have neither the funds nor the expertise to manage complaints effectively – an annual “polluter-pays” levy on woodheaters could provide the necessary funds and also encourage homeowners to follow the advice of medical experts and switch to non-polluting heating.
- 4) revise information (and BASIX software) to include the global warming effect of methane emissions from woodheaters and also carbon dioxide emissions from firewood that is not being produced sustainably, to help people understand the adverse effect of woodheaters on the environment.

The health costs of every new heater installed in urban areas – thousands of dollars per year are enormous. Switching to non-polluting alternatives (such as realistic gas-log heaters) could achieve almost the same benefits without the smoke or methane emissions that damage our health and can cause twice as much global warming as non-polluting alternatives.

I hope you will agree that, in view of the considerable health impacts (in Christchurch, where the authorities have been concerned enough to perform spatial analyses – 16% higher mortality and 68% higher respiratory mortality in the smokiest areas) and estimated health costs - thousands of dollars per heater per year and – this request should be treated as urgent.

Dr Dorothy L Robinson,
Armidale Air Quality Group
www.3sc.net/airqual

Appendix 1 – emissions from lab tests simulating real-life operation have estimated health costs of thousands of dollars per heater year

All heaters smoke if the fire is not hot enough. Consequently, the air control should be left on high for 10-20 minutes after adding more wood. But a recent survey found people rarely operate their heaters in this way; about one-fifth (17.5%) of the time, they re-load the heater and immediately move the air control to its lowest setting. Emissions were measured from 4 brand-new heaters (1 small, 3 large) operated a bit more carefully (waiting 2 minutes before turning the air control to low – test **L2M**). Over the next 8 hours, one heater emitted 183 g of particulates and a second 175 g (emission rates of 17.5 and 22.7 g/kg wood, compared to the AS4103 standard of 4g/kg).^[14]

Because woodheaters produce substantial quantities of heat on high burn (12.5 and 10.2 kW for the 2 heaters described above, too much for the average living room of an insulated house), heaters spend a large proportion

of time on low burn, a smaller amount on medium burn and least of all on high burn. Average firewood consumption in Sydney is 1.9 tonnes per year. If the two heaters in the L2M test burned half Sydney's average firewood consumption on low burn (with the air control turned to low 2 minutes after re-loading), a quarter on high burn and the remainder on medium, they would emit 20.2 and 24.6 kg of PM_{2.5} per year. Using DEH's estimated health cost of \$132 per kg of PM_{2.5} emissions (based on an assumed 4.3% increased mortality per 10 ug/m³ of PM_{2.5}), estimated health costs of these heaters are \$2,500 and \$3,000 per year. Estimated health costs based on the observed 8% increased mortality per 10 ug/m³ in woodsmoky Christchurch would be about \$5,000 - \$6,000 per year if these brand-new heaters were installed in Sydney.

Appendix 2 – methane emissions from real-life operation of woodheater cause more global warming than gas or electric heating

A Swedish study measured methane emissions from old and new wood-fired boilers. As has also been observed in Australian research, methane and smoke emissions are highly correlated, with smoky heaters producing large quantities of methane. One Swedish test had similar smoke emissions (2.2 g/MJ) to the two Australian heaters in the L2M test simulating real-life operation (which emitted 1.79 and 1.34 g/MJ). The Swedish researchers noted that the methane from the heater emitting 2.2 g/MJ would cause **twice as much global warming** as generating the same amount of heat from an oil-fired boiler.^[15]

Average firewood consumption of 1.9 tonnes per year in Sydney^[16] equates to about 18,630 MJ or 5,176 kWh of heat (16 MJ per kg of firewood and 61.3% efficiency). This is substantially greater than the average heating requirement of 3,400 kWh for a 160 m² house in Sydney. The much greater heat used woodheated houses is probably due to inability to control woodheaters. Thermostatically controlled central heating systems turn off automatically when the house has reached a comfortable temperature, and can be programmed to come on in the morning, so are rarely used all night long. In contrast, unless extinguished, woodheaters continue to burn whether or not the heat is required and many are left to burn overnight to avoid the bother of re-lighting the following morning, so a substantial amount of heat is wasted.

Thus a woodheater operated as in the L2M test will almost certainly cause more global warming, perhaps even 2-3 times as much global warming, as heating the same house with gas, or a reverse-cycle heat pump. BASIX should be upgraded to take account of methane emissions (and the proportion of current firewood that is not produced sustainably) and the amount of heat wasted because woodheaters cannot be turned off when the heat is not required, leading to the conclusion that current woodheater models are *worse* for the environment than gas or reverse cycle electric heating.

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