

Health-based standard needed for all new wood heaters

No safe level

There is no safe level of particle pollution – no threshold below which health problems are not observed. Fine particle pollution known as PM2.5 (particles less 2.5 microns in diameter) cause the premature deaths of thousands of Australians every year, the majority at levels below the current Australian standard (NEPC data¹). PM2.5 are believed to be the most health-hazardous air pollutant, responsible for 10 to 20 times as many premature deaths as the next worst pollutant, ozone.

Just as “every cigarette is doing you damage”, every gram of woodsmoke or other particle emissions is also causing health problems. Woodsmoke is more hazardous than cigarette smoke – in tumour initiation tests it was found to cause 12 to 30 times as many cancers as the same amount of cigarette smoke. The estimated health cost of a kg of PM2.5 emissions in Sydney is more than \$235.² Woodsmoke has been described as a “Witches’ brew of carcinogens”. It contains many toxic chemicals linked to genetic damage and behavioural problems in human babies and reduced IQ when children start school. In developing countries, children whose mothers cook over wood (compared to kerosene) stoves have reduced cognitive function and social skills (references: <http://woodsmoke.3sc.net/pah>).

Because there is no safe level of pollution, governments often use cost-benefit analyses, to compare the health costs of polluting activities with the benefits that might arise from those activities.

Cleaning up diesel vehicles

For vehicle pollution, cost-benefit analyses led to the introduction of new standards (Euro 5/6) for diesel utes and sports utility vehicles (SUV) – a limit of 0.005 grams of particles per km, i.e. less than 0.1 kg for a vehicle travelling 20,000 km per year.³

The new standards add about \$980 to the price of the average diesel SUV – [but are considered well worth the \\$1.5 billion saving over the next 20 years in health costs for Australia.](#)

The regulations have reduced PM2.5 emissions by more 99% since 1989, when the average diesel ute or SUV was as polluting as the average wood heater. The Euro 5/6 regulations are so strict, and those for wood heaters so lax, that the average new wood heater in colder areas of NSW emits as much PM2.5 pollution as 370 new diesel SUV each travelling 20,000 km per year.

Now that this source of pollution has been addressed, tackling woodsmoke pollution should be our highest priority.

Costs and benefits of woodsmoke control options

[The NSW Government’s economic analysis](#) showed the estimated health cost of wood heaters is more \$8 billion just in NSW – \$22,000 for every wood heater in the state!!!

The average new wood heater emits about 10 grams of particles per kg of wood (CSIRO’s measurements of real-life emissions in a city that spent \$1 million on wood heater education). So an evening’s heating (10 kg firewood) emits 100 grams of particles – more than the smoke from 5,000 cigarettes. Per year, the average new wood heater in colder regions such as Armidale or Canberra emits more particle pollution than in the smoke of *1.85 million* cigarettes.

Table 1. Estimated health benefits and costs of woodsmoke control options in NSW

	Health Benefit \$million	Cost \$million	Net Benefit \$million
4) Phase out at sale of house	\$4,015	-\$36	\$3,978
2) Ban on heater sales	\$2,206	-\$134	\$2,071
7) Licensing fees	\$1,267	\$11	\$1,278
6) Sales tax on new wood heaters	\$1,049	-\$1	\$1,048
9) Cash incentive phase out	\$879	-\$12	\$867
8) Levying an excise/tax on biomass fuels	\$419	\$36	\$455
5) Fuel moisture content regulations	\$399	-\$33	\$366
3) Emission standards (3g/kg, 60% efficiency)	\$301	-\$3	\$298

Source: Tables 26 and 28, AECOM Office of Environment & Heritage: Economic Appraisal of Wood Smoke Control Measures - Final Report, 29 June 2011

Table 1 compares estimates from the NSW Government's economic analysis of benefits vs costs of various control options. There is a compelling argument for phasing out existing wood heaters when houses are sold – the \$4.015 billion health benefit is many times greater than the cost of just \$36 million.

The next most cost effective option is not allowing the installation of new heaters, estimated to save \$2.206 billion for a cost of just \$134 million. In contrast to the billions from not allowing new heaters, new emission and efficiency standards (option 3 in the table) provide an almost negligible net benefit of only \$298 million.

Wood heaters are much worse than other pollution sources

Although less than 4% of Sydney's households use wood as the main form of heating, woodsmoke accounted for *more than half of all PM2.5* emissions (NSW EPA Emissions Inventory, 2008). A decade ago, wood heaters in New Zealand's had similar emissions to those in Australia, but, from 2000 to 2005, NZ introduced emissions limits of 1.0 to 1.5 g/kg – half the standard (2.5 to 3 g/kg) suggested in Woodsmoke Control Option 1 (p15) of the NSW discussion document. Cities in many countries are also phasing out older-style heaters, e.g all models rated more than 1.5 g/kg were removed in Otago by 1 Jan 2012. The current limit in Otago is 0.7 g/kg. In Christchurch, where new heaters are permitted only as replacements for more polluting models, the limit is 1.0 g/kg. New Zealand's strict limits have led to the development of dozens of new, cleaner models.

New Australian standards resisted by industry

Unlike NZ, the Australian wood heating industry resisted attempts to reduce emissions. In 2007, recommendations by the Australian/NZ Standards Committee (approved 15 votes to 4) to halve the emissions limit (as an interim measure, while a new standard was being developed) were vetoed by the AHHA and another industry representative. Standards Australia had little choice but to abandon attempts to update the wood heater standard.

New technology (such as gas-boosted ignition and afterburners, and temperature sensors to control airflow) might reduce woodsmoke to an acceptable level, but sadly, as noted in the [Federal Government Scoping Paper](#) the wood heating industry has fought attempts introduce health-based standards.

The photo overleaf shows the level of emissions (observed for nearly 1 hour) from a new heater satisfying the limit (2.5 grams of particles per kg fuel) the AHHA proposes for December 2103. Despite the considerable sums spent on education, there's been little improvement in real-life emissions of Australian

wood heaters. With research showing *no safe level of particle pollution*, only those who profit from wood heater sales would argue this acceptable for a new heater in an urban area.

Table 2. Comparison of lab-test and real-life emissions for new heaters, estimated health costs for a heater installed in Sydney and the number of Diesel SUV required to produce the same level of annual emissions.

Lab-test	<u>Sydney</u>				<u>Colder rural area</u>		
	Real-life	Real-life	Health Cost	Diesel SUV	Real-life	Health Cost	Diesel SUV
4 g/kg	8.8 g/kg	18.6 kg	\$4436	186	39.2 kg	\$2188	392
3 g/kg	7.6 g/kg	16.8 kg	\$3992	168	35.3 kg	\$1970	353
2 g/kg	7.0 g/kg	14.4 kg	\$3420	144	30.2 kg	\$1687	302
1 g/kg	6.4 g/kg	13.3 kg	\$3167	133	28.0 kg	\$1562	280

Source: AECOM Office of Environment & Heritage: Economic Appraisal of Wood Smoke Control Measures - Final Report, 29 June 2011. Emissions by lab test rating, table 15 (9.8 g/kg for limit of 4 g/kg); table 18 (reductions of 10%, 22.9%, 28.6% and 34.3% for ratings of 3, 2 and 1 g/kg respectively). Table 24 - estimated Health costs for capital cities (\$235.26/kg PM2.5) and rural areas (\$55.82/kg PM2.5). Estimates are based on assumes average firewood consumption of 1.9 tonnes per year in Sydney and 4 tonnes per year (the average for Armidale, NSW and Canberra) in a cold rural areas.

A new health-based standard will require a wood heater test that reflects real-life emissions. Although some models are relatively clean under perfect operation in laboratory tests, even after a \$2.05 million woodsmoke education program in Launceston, very few of the heaters installed in volunteers' houses had acceptable emissions. The table below shows compares laboratory ratings for new heaters with real-life emissions and estimated health costs in Sydney and rural areas, and the number of new diesel SUV needed to produce the same amount of PM2.5 pollution. Health costs in regional areas are likely to lie between estimates for rural areas and those for Sydney. For example, health costs in Armidale, NSW were estimated at \$4270 per woodheater per year.

Table 2 shows that there are few, if any, urban areas, where the estimated health costs of wood heating are less than the estimated benefits, so that a state-wide policy is needed for all urban areas. Even if rural areas, with low population densities and access to free firewood, there are still substantial health costs of using wood heaters. In fact, when the United Nations Environment program screened over 2,000 proposals to reduce global warming from methane, black carbon and ground-level ozone, phasing out wood heaters in developed countries was on of the top 16 measures - <http://woodsmoke.3sc.net/greenhouse>

Dozens of new, cleaner wood heaters were developed in New Zealand after new standards were introduced. If the Australian industry wishes to flourish, they must do the same, instead of scaremongering consumers about non-existent proposals to ban woodheaters. Consumers who know the truth would surely choose to delay upgrading heaters until cleaner models have been developed, rather than install current models that emit more pollution per year than 100 new diesel cars.

Further information:

- 1. NEPC data on premature deaths from PM2.5 pollution** – see figure A2.2 of: Methodology for setting air quality standards in Australia Part A: <http://www.scew.gov.au/publications/pubs/air/methodology-air-quality-standards-in-australia-parta.pdf>
- 2. [AECOM Economic Analysis on woodsmoke control options](#)**
- 3. Current emission levels for diesel cars** - <http://www.news.com.au/national-old/car-pollution-crackdown-to-save-lives/story-e6frfkvr-1226073347555> The Euro 5/6 standard requires emissions of .005 g/km -

http://en.wikipedia.org/wiki/European_emission_standards - i.e. 0.1 kg of particle emissions if travelling 20,000 km per year.

4. Estimated health effects in Armidale: <http://www.sciencedirect.com/science/article/pii/S1352231007001033>

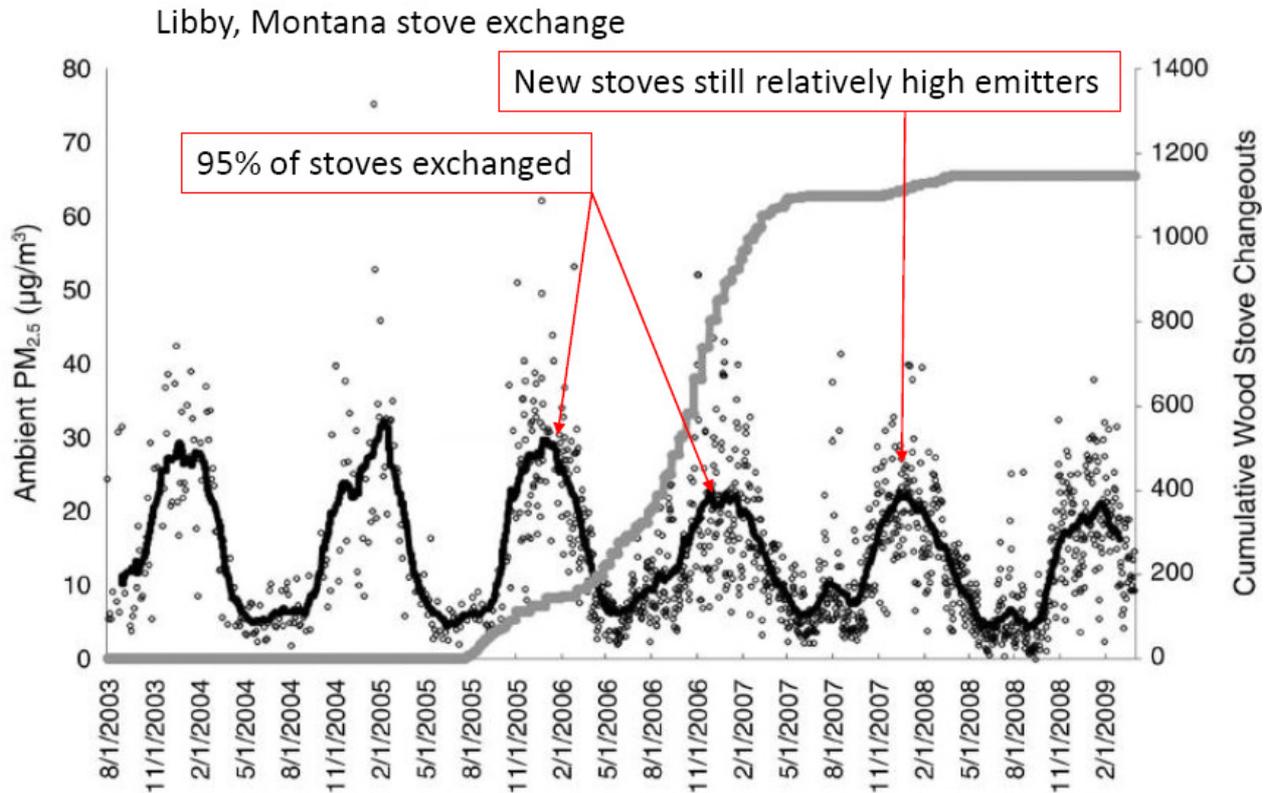
5. Federal Government Scoping Paper: “Governments have been unable to achieve improvements to national woodheater emission standards due to industry veto in Standards Australia processes. The emissions standard was last revised in 1999 and the current level of 4 grams of particles per kilogram of wood burnt is well above levels achievable by latest technologies and the emissions standard set in New Zealand (ie. 1.5 g/kg).” -p2, EPHC17/8.1

6. Estimated health effects of PM2.5 vs Ozone: The NSW Government’s 2009 update of “Action for Air” discusses health: in Europe 3.6 million life years are lost annually from particulate pollution (approx 360,000 premature deaths), with ozone causing 21,000 cases of hastened mortality.

7. Christchurch’s Clean Heat Program – the increase in electricity use from using heat pumps instead of wood heaters (just 1% of total electricity consumption) was substantially less than the cost of buying firewood: O’Connell, M. J., M. R. Gaudin, et al. (2010). "The Clean Heat Project: Improving air quality and energy efficiency outcomes for the Canterbury Region." *Air Quality and Climate Change* **44**(2): 28-34.



Real-life emissions from the standard the wood heating industry representatives (the AHHA) proposed to introduce in December 2013.



Claim by Prof Michael Brauer: “New stoves still relatively high emitters”.

<http://www.bc.lung.ca/documents/Biomass-BCLAWebinar.pdf> The graph clearly shows unacceptable air pollution levels, linked to substantially increased risk of premature death, after all stoves were replaced with new ones.

AHHA Claim: “On completion of the change-out program, Libby Montana has improved its air quality by 80%.” They cite a document that claims a 28% reduction in outdoor particulate pollution, nothing like the AHHA’s claimed 80%! There was a larger reduction in indoor air pollution of people using stoves (72%) presumably because some older stoves were faulty and discharged large amounts of unhealthy pollution into people’s homes. Given the above graph showing that outdoor pollution remained at unacceptably high and unhealthy levels, the AHHA’s claim of an 80% reduction is as deceptive as the claims tobacco industry that also put profits before people’s health.

Another example of mis-information from the wood heating industry.

ACT Air Quality Report: "There were four exceedances of the PM_{2.5} 24-hr advisory reporting standard which occurred in May and July 2011. These exceedances were due to wood heater emissions in winter." The graph clearly shows an increase in PM_{2.5} concentrations in winter. There is no safe level of PM_{2.5} pollution – the peaks just below the standard likely to cause similar health problems to the 4 exceedances.

Despite the evidence of a substantial increase in pollution despite only 2.3% of households using wood heaters, Demi Brown, AHHA General Manager, claims she cannot see any increase in wintertime particle pollution!

Report available at: [http://www.environment.act.gov.au/_data/assets/pdf_file/0012/251220/Att A - 2011 ACT Air Quality Report- web.pdf](http://www.environment.act.gov.au/_data/assets/pdf_file/0012/251220/Att_A_-_2011_ACT_Air_Quality_Report-web.pdf) Other examples of misleading information from the wood heating industry: <http://woodsmoke.3sc.net/ahha-tactics> and <http://woodsmoke.3sc.net/canberra>

