Australian Air Quality Group Supplementary Submission:
Consultation regulation impact statement (CRIS) for reducing emissions from wood heaters

The importance of the Senate Inquiry into the health effects of air pollution was aptly illustrated by the NEPCSC's '*Consultation regulation impact statement (CRIS) for reducing emissions from wood heaters*' (released 13 April 2013). An estimated 40,000 tonnes of woodsmoke are emitted per year (800,000 tonnes over 20 years, estimated health costs: $24 billion[a]). A NSW Evaluation[1] discussed three measures that might reduce this by 75% for a cost of less than 2% of the health benefits. Instead of these effective measures (potentially reducing health costs by $18 billion), the CRIS considers measures that at best might reduce health costs by $0.75 to $1.8 billion. This lack of effective measures appears to stem from two significant failures – the failure to put public interest first when considering possible regulatory measures and the failure to explain and educate the public about the sources of air pollution and their health impacts.

Failure to put public interest first when considering possible regulations

Regulation is needed when market forces do not serve the public interest. Air pollution is an obvious example – the health problems affect the entire community, especially downwind neighbours of people using wood heaters, but the benefits are enjoyed only by a minority who use wood heating.

The clear need for effective regulation was demonstrated by the very high pollution measurements in Launceston – a small city with no major sources of industrial pollution, in conjunction with a study in 2002 of wood heater emissions by Dr John Gras showing that one of the two AS4013 compliant heaters tested had double the emissions of the older model (manufactured in 1985) used in the study. On low burn, the new heater had totally unacceptable emissions of 12.6 g/kg.[2] Apart from when the fire is being lit (with very high emissions that the AS4013 test does not measure) and short periods heating up a cold house, most wood heaters are likely to be used on low burn for most of the time.

The need for regulation became even more apparent with the adoption in NZ in 2005 of an emissions limit of 1.5 g/kg for all wood heaters installed in urban areas, plus further restrictions in areas where woodsmoke builds up. A peer-reviewed research paper published in 2005 showed that estimated health costs of Australian wood heating exceeded $2,000 per wood heater per year (about $166 per kg of emissions) compared to estimated costs of about $2.1/kg PM2.5 for avoiding emissions by phasing out wood heaters[3].

In 2007, the need for effective regulations was again highlighted when the Australian wood heating industry vetoed recommendations (approved 15 votes to 4 by the Standards Australia Committee) for a reduction in the emissions limit for wood heaters to 2 g/kg, as an interim measure while a new emissions limit, and new test measuring real-life emissions, was being developed.

Failure to educate and inform

The second major problem in relation to domestic woodsmoke emissions is the lack of public knowledge about the magnitude and dangers of pollution from wood heaters. Consultation with people who believe woodsmoke is harmless will not be particularly helpful in identifying policies that are truly in the public interest.

This extent of this problem was illustrated by a survey in Armidale in 1999 reporting that 52% of residents with wood heaters believed the statement "emissions from open fires and solid fuel heaters contain substances harmful to humans" was false. Only 24% said it was true, the remainder were unsure.[4] This was despite a $46,000 wood smoke education program by the NSW EPA in Armidale a couple of years earlier.

People know that cigarette smoke is harmful. Adverts by the tobacco industry are no longer permitted, so the advice of health experts cannot be countered the interests of a profit-driven industry. When people understand the health effects of woodsmoke pollution, few actually want to use wood heating. This was illustrated by the effective education program in Launceston that (although it might not have attracted the attention of all householders) reduced wood heater use from 65% to 15% of households.[b]

To date, key messages such as that woodsmoke contains the same and very similar chemical to cigarette smoke, that Ames tests on bacteria and tumour initiation tests on mice show woodsmoke is 12 times worse than the same amount of cigarette smoke, or that the average new wood heater emits 100 to 400 times as much PM2.5 pollution as the average new diesel car or 4WD are not well understood by the general public. How many people buying new wood heaters

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[a] A reduction of 60,000 tonnes was valued at $1.8 billion (Table 7.2), implying a health cost of $24 billion for 800,000 tonnes

[b] See section A6.3.2 of the consultation regulation impact statement for reducing emissions from wood heaters

know that the Australian Lung Foundation recommends using alternative methods (to wood heaters) for climate control? How many know that the American Lung Association "*strongly recommends using cleaner, less toxic sources of heat. Converting a wood-burning fireplace or stove to use either natural gas or propane will eliminate exposure to the dangerous toxins wood burning generates including dioxin, arsenic and formaldehyde"?*

Even fewer people know about the research linking toxic chemicals known as PAH to genetic damage in babies and reduced IQ and behavioural problems when children start school, or that these findings are confirmed by studies in Belize, Kenya, Nepal and American Samoa, and also in Guatemala showing that children whose mothers cook with wood (as opposed to kerosene stoves) have reduced IQ, memory and poorer social skills - http://woodsmoke.3sc.net/pah

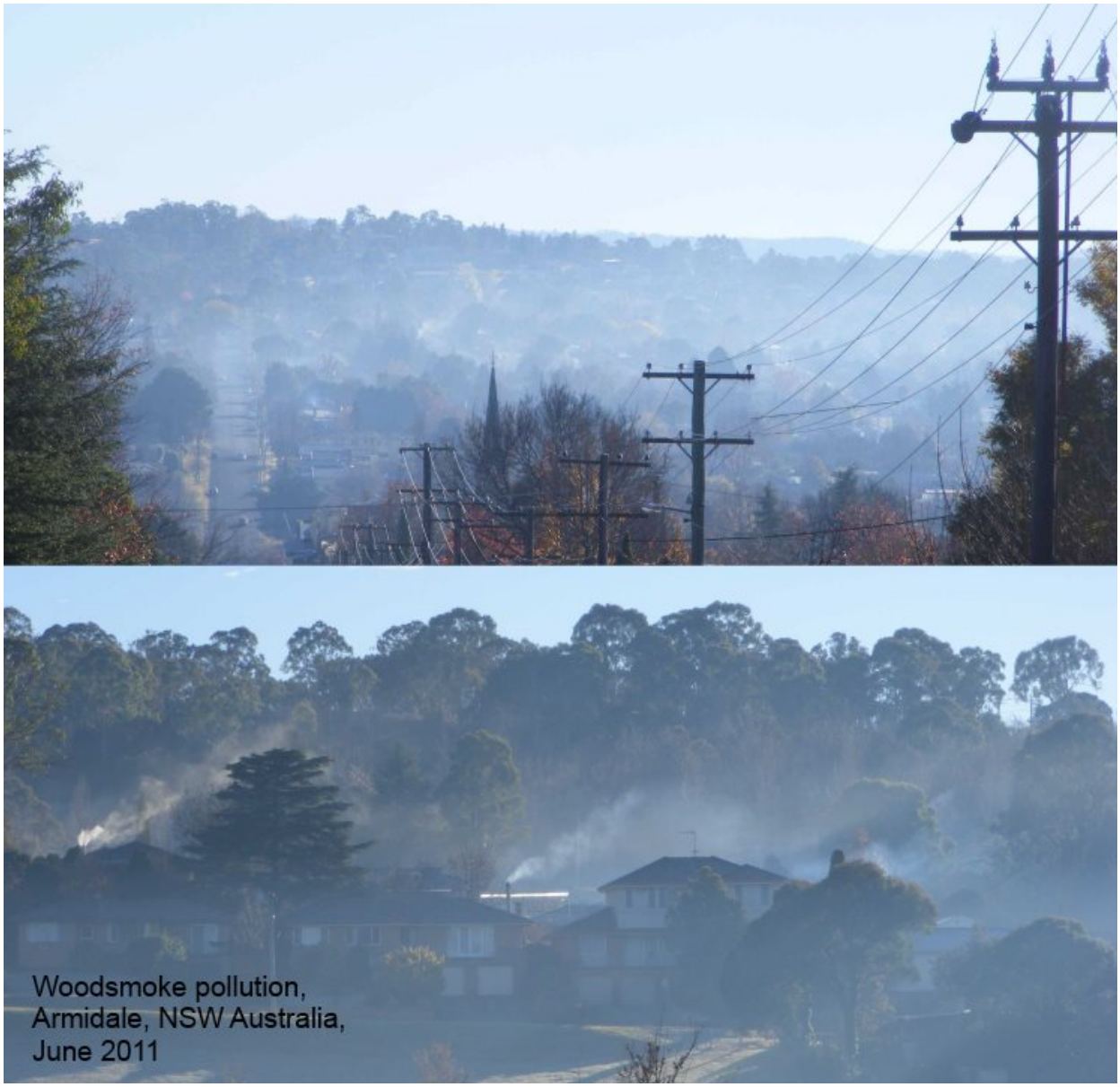
It is therefore relevant to ask what proportion of people would want to use wood heaters, or live next door to a wood heated house if they understood the true effects of woodsmoke on health, or were informed about the amount of health-hazardous pollution emitted by the average wood heater compared to motor vehicles or other household sources.

Role of the Senate Inquiry

A brief discussion of the Woodheater Consultation RIS is given overleaf. None of the policy options in the CRIS appear to be in the public interest. They all allow the installation of many more new heaters with totally unsatisfactory emissions. The Senate Inquiry should therefore consider and make recommendations on:

1) the need for temporary measures to prevent the situation from getting worse. Why do all policy options in the CRIS allow new heaters to be installed with estimated health costs of thousands of dollars per heater per year? There is no safe level of PM2.5 pollution, so the health costs of installing new wood heaters in areas without a recognised woodsmoke pollution problem are just as high as in other areas.

2) the need to remove currently-installed heaters with totally unsatisfactory health costs of thousands of dollars per heater per year, as illustrated by the photos below of Armidale in 2011, where policies similar to those proposed in the RIS have been tried and, despite hundreds of thousands of dollars spend on woodsmoke reduction in the past 17 years, woodsmoke pollution is now higher than in 1999.



Additional Information

Precautionary Principle

Regulations should be guided by the precautionary principle – if there are serious doubts about the safety of an activity, it should not be permitted unless there are clear benefits outweighing the safety considerations.

Australian wood heaters are estimated to emit 40,000 tonnes of particulate air pollution – with total estimated health costs nearly 4 times greater than traffic pollution. The table below shows the alarming estimates in the Consultation Regulation Impact Statement (CRIS) of the health costs – *thousands of dollars* per wood heater per year – of installing new wood heaters in urban areas. The CRIS reports no offsetting benefits – buying firewood is very expensive – over $1,000 per year in Melbourne, a city where Matthew Wright, chairman of 'Beyond Zero Emissions' recently replaced gas heating with electric heat pumps. Matthew's system delivers 10 units of heat for every unit of electricity, causing less than a sixth the global warming of a typical new wood heater in Melbourne, with running costs less than a tenth the cost of buying firewood.[5, 6]

Table 1. Estimated annual cost of heating per household (selected locations) and estimated health costs compared to the cost of alternative heating (an efficient reverse cycle heat pump).

	Firewood Price ($/tonne)[a]	Wood use tonnes[a]	Annual wood heating cost[a]	Annual health costs New wood heater[b]		Annual cost: whole-house heating with efficient heat pump[c]
				A	B	
Tasmania	$150	10.28	$1,540	NA	NA	$500 - $700
Sydney	$380	3.43	$1,300	$7,938	$6,044	$150 - $300
Wagga Wagga	$180	4.08	$730	$4,057	$3,089	$300 - $600
Melbourne	$300	3.75	$1,130	$8,679	$6,608	$150 - $300
Perth	$270	3.09	$830	$7,151	$5,445	$150 - $300

[a]*Price, wood use and annual wood heating costs from Table 2.2 of the consultation RIS (CRIS)* http://www.scew.gov.au/strategic-priorities/clean-air-plan/woodheaters/index.html [b]*Annual Health costs based on CRIS Table 3.2 – $263,000 per tonne in capital cities and $113,000 per tonne in Wagga. Real-life emissions calculated from Table 18, of the NSW OEH economic appraisal of wood heater control options. A: wood heaters rated < 3 g/kg have real life emissions = 8.8 g/kg; B: heaters rated < 1.5 g/kg have real life emissions = 6.7 g/kg).[1]* [c]*Efficient heat pumps in Sydney, Melbourne and Perth can deliver at 10 units of heat to a home for every unit of electricity used.[5]*

With much better, cheaper ways of heating homes, the government's primary role should be protect public health. The current regulations failed elderly residents in the Sydney suburb of Pittwater, when their "*next door neighbour installed a new and approved wood burning heater in 2010*" – see http://woodsmoke.3sc.net/experien *The smoke "immediately entered most rooms of our old, renovated house. My wife's asthma was triggered by the smoke and last winter she developed bronchitis and needed multiple treatments with antibiotics.* As well as suffering health problems, the couple was forced to seal all doors and windows and spend $7,000 installing reverse cycle heating because they could no longer use their flued gas heater (which draws in (polluted) outside air to replace that discharged up the flue). Although these measures helped, they would "*dearly love to again turn on our gas log fire, be able to open a bedroom window at night, enter through our front door and to tend our garden during the winter*".

The proposed CRIS fails to estimate or even recognise the cost of problems such as the above, and does nothing to prevent them from happening in future. There is no discussion of why heaters with estimated health costs of thousands of dollars per year should be allowed when there are much cheaper and better ways of heating homes. Nor does it say why, when NZ was able to introduce an emissions limit of 1.5 g/kg in 2005, Australians have to wait until 2020 to introduce the same limit. What is the health cost of this delay compared to the benefit?

No safe level of PM2.5 pollution

There is no safe level of PM2.5 pollution – the costs in Table 1 apply irrespective of whether air quality standards are met or whether wood heaters are major contributors to poor air quality. Even relatively low levels of woodsmoke pollution (in areas that meet current air quality standards) cause major health problems. Recent research compared residential areas with wintertime woodsmoke averages of: A) less than 6.8 ug/m^3, B) 6.8 to 10 ug/m^3 C) more than 10 ug/m^3. After adjusting for the effect of black carbon, NO_2 and other PM2.5 exposure, people living in areas with winter woodsmoke of more than 10 ug/m^3 had a 15% higher risk of COPD (chronic obstructive pulmonary disease).[7]

A National program to reduce the health damage from breathing woodsmoke *is therefore required in all urban areas, whether or not wood heaters are demonstrably a major contributor to air quality problems*. Estimated health costs of a single wood heater in an urban area surrounded by other houses do not depend on whether other houses use wood heating. In fact, the case for removing a single wood heater detrimentally affecting the health and lifestyle of several neighbours using non-polluting heating is arguably greater than the case for removing wood heaters elsewhere.

The CRIS argues that "removal of non-compliant heaters on the sale of a house and bans on installation in critical airsheds were not considered feasible as part of a national program" because such measures would be "blunt in terms of imposing unnecessary restrictions on households in areas not experiencing air quality impacts related to wood heaters". However, as noted above, this argument is incorrect – the CRIS paper shows that all existing wood heaters in all urban areas have *estimated health costs of thousands of dollars per heater per year*.

A National Program is therefore required to protect public health by developing a satisfactory standard for new heaters and requiring the removal of all heaters (e.g. when houses are offered for sale) that do not comply with the desired standard and therefore have unacceptable health costs.

Recommendations

1) That the Federal Government commissions research to develop a real-life emissions test and new standard for wood heaters that ensures the estimated health costs are less than any benefits of using wood heaters.

2) A moratorium on the installation of new log-burning heaters in urban areas until models have been developed that comply with this standard.

3) As in Christchurch, NZ, models with AS4013 emissions rating < 1.0 g/kg should, however, be permitted as replacements for more polluting models. Pellet heaters with emissions rating < 1.0 g/kg would also continue to be permitted in all houses.

4) All log-burning heaters in urban areas that do not comply with the new standard to be removed before houses are offered for sale.

5) An annual levy on woodheater use (with subsidies for low-income families) in urban areas to fund an education program and provide subsidies to upgrade insulation and replace wood heaters with high efficiency gas, electric, solar or wood pellet heaters.

6) A National Woodsmoke Education program to inform the public about the health problems caused by breathing woodsmoke, the Australian Lung Foundation's recommendation not to use wood heaters when non-polluting alternatives are available, and the recommendation of the UN Environment Program and World Meteorological Association that developed countries phase out log-burning heaters to reduce global warming as well as improve health. The program should explain that the average new wood heater emits 190 to 400 times as much PM2.5 (believed to be the most health-hazardous air pollutant) as the average new car or diesel sports utility vehicle. Advice should also be offered on the savings from installing insulation and the cost of alternative heating.

7) All cities and airsheds to measure the most health-hazardous air pollutant (PM2.5) and issue 'Don't Light tonight' warnings on local TV, radio and the internet for all areas where breaches of the PM2.5 standard are forecast.

8) A National Air Pollution hotline to allow people affected by woodsmoke to obtain assistance.

9) The inaccuracies, known since 2008, in the National Pollutant Inventory (NPI) which under-estimates particle emissions from woodheaters by about 50% should be fixed immediately. Other major inaccuracies in the NPI (e.g. the lack of accurate data for PM2.5 and for toxic chemicals such as ethylbenzene) should be fixed at the same time and new protocols developed to ensure that major errors in the NPI are fixed in a timely manner.

References & supplementary information

Table 2. 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[1]
The total estimated health costs of woodsmoke in NSW are more than $8 billion

1. NSW OEH, *Economic Appraisal of Wood Smoke Control Measures*. 2011, AECOM Australia Pty Ltd. Prepared for the Office of Environment and Heritage. Available at:http://www.environment.nsw.gov.au/woodsmoke/smokecontrolopts.htm.
2. Gras, J., *Emissions from Domestic Solid Fuel Burning Appliances.* 2002, Environment Australia Technical Report No. 5, March 2002. Available at: http://www.environment.gov.au/atmosphere/airquality/publications/report5/index.html.
3. Robinson, D.L., *Air pollution in Australia: review of costs, sources and potential solutions.* Health Promotion Journal of Australia, 2005. 16: p. 213-220.
4. Khan, L., *Particulate Air Pollution in Armidale*. 2002, PhD Thesis, Univ. New England, Armidale, NSW.
5. Wright, M., *Why I have six air conditioners.* Climate Spectator. http://www.climatespectator.com.au/commentary/why-i-have-six-air-conditioners (accessed 13 March 2012), 2011.
6. Robinson, D.L., *Australian wood heaters currently increase global warming and health costs.* Atmospheric Pollution Research, 2011. 2(3): p. 267-274.
7. Gan, W.Q., et al., *Associations of Ambient Air Pollution with Chronic Obstructive Pulmonary Disease Hospitalization and Mortality.* American Journal of Respiratory and Critical Care Medicine, 2013. 187(7): p. 721-727.