Asthma Foundation NSW – Wood Smoke Submission

15th July 2013

Standing Council on Environment and Water Secretariat
GPO Box 787, Canberra, ACT 2601
Per: scew.secretariat@environment.gov.au

Re: Consultation regulation impact statement for reducing emissions from wood heaters

Introduction

This paper is being submitted by Asthma Foundation New South Wales (AFNSW) on behalf of Asthma Australia. AFNSW has been a strong advocate for clean air and has run many high-profile campaigns on the need to reduce various kinds of air pollution including unflued gas heaters; road tunnels; coal-fired and gas power stations; wood-fired heaters; traffic; and bushfire emissions.

Asthma in Australia

More than 2.2 million (10%) of Australians have asthma and in 2009, asthma was the cause of death for 411 Australians.[1] We don't know the cause and don't yet have a cure[2]. Many people with asthma report poorer quality of life; a substantially higher proportion of days of reduced activity with impacts on physical and social activity; and poorer mental health[3].

Evidence [4] consistently shows that people with asthma and their carers urgently need more information and community support to safely self manage their asthma. Asthma Australia, working through its state and territory Foundations and strong intersectoral partnerships, has the skills, experience and mandate to do this work.

Asthma Australia

Asthma Australia is the recognised national community voice of Australians with asthma and linked conditions and their carers. It comprises the Asthma Foundations from each Australian state and territory working together on national policy, advocacy and programs and promoting research. It is a national, nongovernment, incorporated body with no political affiliations.

We look forward to the outcome of this important consultation which has the potential to improve both air quality and subsequently the health of Australians.

Yours sincerely,

Michele Goldman
CEO, Asthma Foundation NSW

[1] Australian Centre for Asthma Monitoring [ACAM] 2008 *Asthma in Australia 2008* AIHW Asthma Series no. 3.Cat. no. ACM 14. Canberra: AIHW.
[2] Asthma Australia, *Asthma basic facts*, 2012
[3] ACAM ibid
[4] Centre for Health Initiatives , The self management needs and wants of adults with asthma in NSW. Gillian Stillfired, Sandra Jones and Kelly Andrews, 2010 (embargoed)

1. What is your view of the wood heater industry in Australia? Are there specific aspects of the industry that require attention? Please provide details.

Asthma Foundation NSW believes that the wood heater industry, represented by the Australian Home Heating Association (AHHA) has for a long time represented the interests of wood heater retailers, but not necessarily the health of the public. Despite being a commercial body with a clear vested interest, it has been able to exert an undue influence over changes to regulations and emission limits.

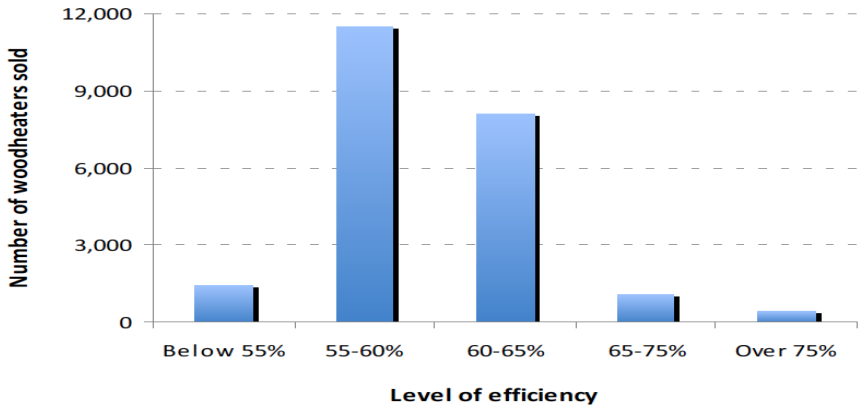
For example, in 2007, the majority of the Australian/ New Zealand Standards Committee supported reducing the wood heater emissions standard from 4g/kg to 2g/kg.[5] It also proposed a minimum efficiency standard of 50%.[6] However, the policy of Standards Australia is that major stakeholders (such as industry or community representatives) can veto changes to a standard. In this case, the wood heater industry representatives vetoed the proposed emission and efficiency limits, and no changes were made to improve the standard. [7]

Consequently there have been no changes to wood smoke emission standards for two decades and as a result Australia's current wood smoke emissions standard of 4g/kg with no efficiency standard lags some way behind other industrialised countries, most notably New Zealand which has moved to a 1g/kg emissions limit for wood burning stoves. Whilst commercial interests should not be ignored, public health must be the priority – especially as new less polluting fuels and heaters are readily available and being used in countries around the world.

It would appear that the wood heater industry has only put forward the current proposals following recent NSW Government studies on the effect on wood smoke on health, concerted moves by health and environment groups and the announcement of a Federal review. The AHHA's proposed new standard of 2.5grams of particulate matter (PM_{10}) emitted per kilogram of fuel burnt (2.5g/kg) and a new efficiency standard of 55% would still leave Australia some way behind best practice. A survey of wood heater manufacturers conducted by Walter Turnbull in 2009[8] provides information on the design profile of wood heaters sold in Australia in 2007-08. It showed the vast majority (+50%) of the 12,000 heaters sold each year in Australia have an emission efficiency criterion of 55-60% - which is what AHHA is proposing – a standard that CRIS says isn't working. The survey results suggest around 70% of wood heaters sold had a design emission level between 2g/kg kilogram and 4 grams per kilogram. **In effect, the AHHA is proposing to maintain a status quo, not an improvement in emission standards.** This point is illustrated by Figures 2.6 and 2.7 in the CRIS document.

[5] Standards Australia Solid Fuel Burning Appliances Committee, Minutes of Meeting 16/ 17 March 2007
[6] ibid
[7] Dr John Todd, "Regulation of residential wood smoke in Australia" (2007 Clean Air and Environmental Quality 41(3), 15
[8] DEWHA, 2009, *Industry Survey of Wood Heaters and Other Solid Fuel Heaters*, Walter Turnbull on behalf of the Australian Department of Environment, Water, Heritage and the Arts http://www.environment.nsw.gov.au/resources/air/WoodsmokeControlReport.pdf Viewed 8/7/2013

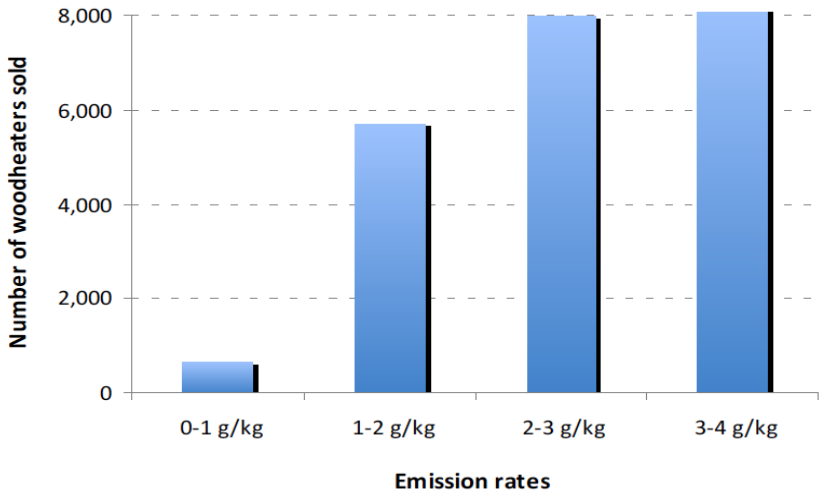
Table 1 – Design efficiency of wood heaters sold in Australia



Source: WalterTurnbull 2009

Around 50% of wood heaters sold had a design efficiency of 55-60%, and around 35% had an efficiency of 60-65%.

Table 2 – Design emission levels for wood heaters sold in Australia, 2007-08



Source: WalterTurnbull 2009

This fact also highlights just how far behind the rest of the world Australia's wood smoke emission standards are. Australia has already surpassed the existing standards as a consequence of the evolution of design, rather than a realisation that these wood heaters cause environmental and health issues. This is a natural consequence of progress. The AHHA are proposing a reduction to the official standard, which simply reflects the standard that is currently being sold in the market place. We need a significantly improved standard which comes closer to countries like New Zealand.

2. Can you provide evidence of new or different operational or marketing paradigms that would affect the stated view?

Following a pioneering wood heater replacement scheme in Libby, in the American state of Montana, which saw wood smoke pollution reduced by 28%, the AHHA is on record as claiming an improvement of "more than 80%".[9]

This implies that consumers wishing to buy new heaters are being misled about the level of emissions from those heaters. The claim about the benefits of the Libby change-out is one of a long line of false claims made by the AHHA, for example, "Wood heating is the natural way to heat your home without harming our environment and emitting harmful gases" (press release, May 2012)[10] despite the fact that the chemicals emitted are considered so harmful they are covered by an Air toxics NEPM – benzene, formaldehyde, toluene, xylene and PAH – and are all emitted by wood heaters, usually as gases, and in most cases in higher quantities than by the average vehicle. For example, the average wood heater in Sydney produces 39 times as much formaldehyde as the average vehicle, 10 times as much PAH and 6 times as much benzene.[11]

The AHHA is also on record as claiming in 2010 that "*Substantial technological advances in the past five years have led to modern wood heaters that produce only a small fraction of the smoke and particle emissions that earlier models did. In most cases up to 80% less.*"[12] The estimates provided in CRIS Table 2.7 (see above) do not support this claim.

Under legislation to prevent misleading and deceptive advertising, a regulator is required to protect consumers from being misled by industry bodies. There is evidence that many people who buy new wood heaters have been led to believe that wood heaters are clean and environmentally friendly. People who understand the truth – that the average new wood heater emits as much health- hazardous PM2.5 pollution as 190 to 400 new diesel cars or 4WD vehicles are unlikely to choose this form of heating.[13]

3. Do you consider wood heater emissions to be a significant issue relative to other forms of air pollution?

Yes, Asthma Foundation NSW contends that wood heater emissions are a significant issue relative to other forms of air pollution both in terms of the levels of air pollution and health.

The latest NSW EPA emissions inventory shows that, even in Sydney's mild climate, more than 50% of anthropogenic PM2.5 emissions are due to just 5% of houses using domestic wood heating, compared to 14.4% from on-road traffic (see Table 3 below).

[9] AHHA submission *Exposure Draft Legislation: Environment and Construction Occupations Legislation (Wood Heaters) Amendment Bill* 2012 pg 6 http://www.thinedge.com.au/Exposure-Draft-Legislation-2012.pdf
[10] *Keep warm without compromising safety* AHHA Media Release 10/5/2012 http://www.homeheat.com.au/pdf/safety_around_wood_heating_may_2012.pdf viewed 8/72013
[11] Australian Air Quality Group – Wood smoke http://wood smoke.3sc.net/woodheater-car-comparison viewed 4/7/2013
[12] AHHA website – Air Quality section http://www.homeheat.com.au/enviro_air.htm Viewed 4/7/2013
[13] Australian Air Quality Group - Car wood heater comparison http://woodsmoke.3sc.net/woodheater-car-comparison

According to the NSW Environmental Protection Agency[14] (EPA) the latest draft inventory numbers show that in 2008 wood heaters and open fireplaces contributed to almost 8.5% of annual particle pollution in the GMR. In Sydney alone, the share of particle pollution emitted from wood heaters and open fireplaces was almost 35% of annual particle pollution as shown in Table 4 (below).

Table 3 – Monthly PM2.5 emissions in the Sydney region

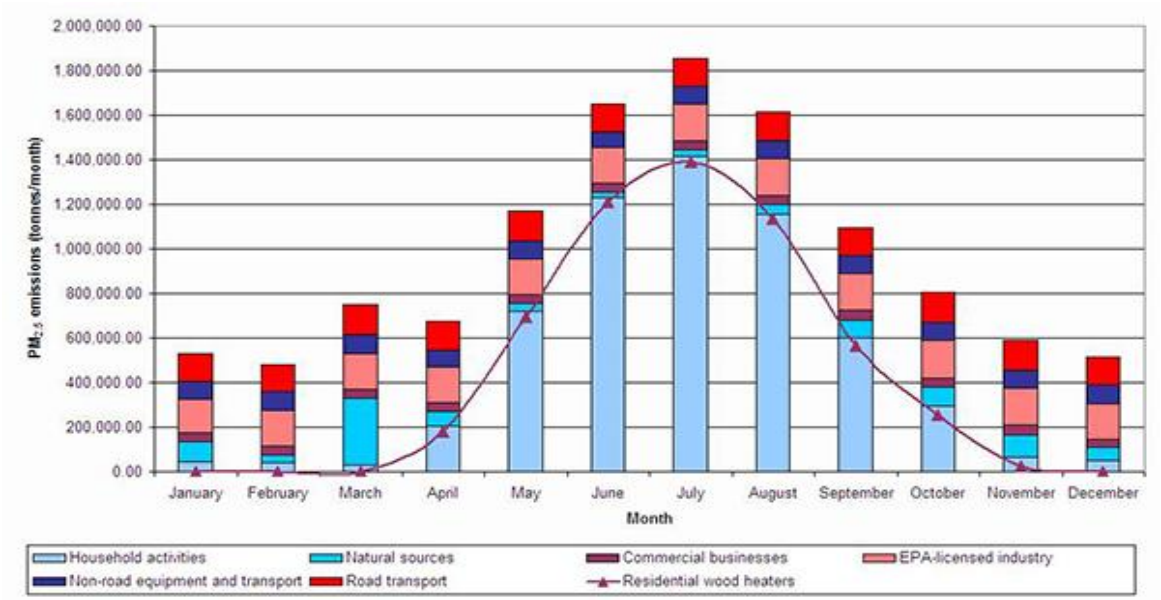


Table 4 – Sources of human-derived particle emissions in Sydney

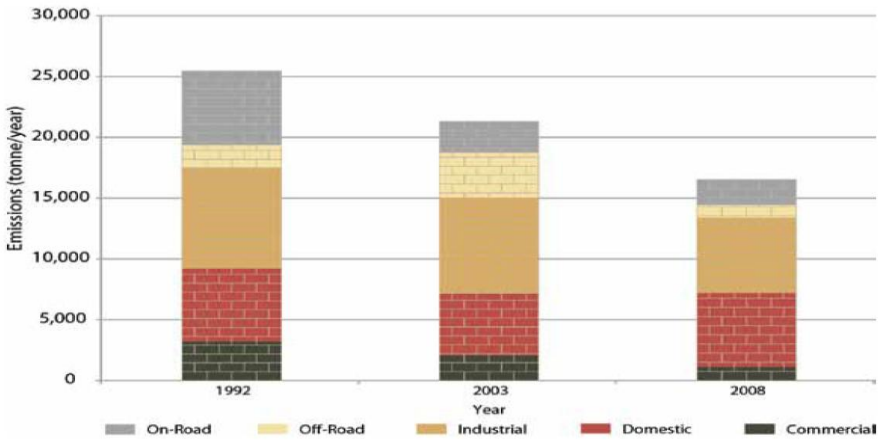


Figure 1: Sources of human-derived particle emissions in Sydney

Note: Over 93% of 'domestic' particle emissions in Sydney were from wood heaters and open fireplaces in the draft 2008 inventory.

[14] *Options for Wood Smoke Control – Discussion Paper* NSW Environmental Protection Agency pg 4 http://www.epa.nsw.gov.au/resources/wood smoke/120267Wood smoke.pdf Viewed 4/7/2013

Over time, the NSW EPA also found that the contribution to particle pollution from wood heaters and open fireplaces in the GMR has been increasing. Comparing inventory data between 2003 and 2008, particle pollution from wood heaters grew by 24% and firewood consumption by 44% over this period.

It also reported that its 2008 draft inventory found motor vehicle emissions are decreasing due to the strong regulatory framework in NSW and Australia, but emissions from the domestic sector are rising, in both absolute terms and as a proportion of all emissions.

In colder rural areas the contribution of wood smoke to outdoor air pollution is even higher.[15] In ACT and New England it can reach 85% and is well over 90% in Tasmania.

A recent NSW Government report estimated the health costs of the average new wood heater installed in Sydney at $4,436 per year – many times higher than the benefit of allowing such heaters to be installed.[16]

The fact that wood heaters produce more than 50% of PM2.5 emissions in Sydney and create an estimated health cost of more than $3,000 per year (Table 5) for a new wood heater, demonstrates how significant this form of air pollution is.

A substantial body of peer-reviewed Australian and overseas scientific studies conducted over the past 20 years have cited the toxins, gases and fine particulate matter produced by the burning of wood as a major risk factor for asthmatics[17]. It exacerbates asthma symptoms and has been associated with higher rates of asthma in areas where wood burning takes place over a sustained period each year.[18]

A 2013 study of 312,000 people in nine European countries[19] has produced conclusive scientific proof that there are no safe levels of PM2.5. Unexpectedly, the new study found a cancer risk at every level, and confirmed that the higher the level, the greater the risk.

The study concluded that every increase of five microgrammes per cubic metre of PM2.5 increased the risk of lung cancer by 18 per cent. Every increase of 10 microgrammes per cubic metre of PM10 increased risk by 22 per cent, including for adenocarcinoma, a type of lung cancer associated with non-smokers.

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[15] Robinson DL. Air pollution in Australia: review of costs, sources and potential solutions. *Health Promot J Aust* 2005; 16: 213-220

[16] *Options for Wood Smoke Control – Discussion Paper* NSW Environmental Protection Agency pg 4 http://www.epa.nsw.gov.au/resources/wood smoke/120267Wood smoke.pdf Viewed 4/7/2013

[17] *Oxidative stress, DNA damage, and inflammation induced by ambient air and wood smoke particulate matter in human* A549 and THP-1 cell lines. Danielsen et al. Chem Res Toxicology 2011 Feb 18;24(2):168-84. Epub 2011 Jan 14. http://www.ncbi.nlm.nih.gov/pubmed/21235221

[13] *Low-Level Subchronic Exposure to Wood Smoke Exacerbates Inflammatory Responses in Allergic Rats* Tesfaigzi et al. Oxford Journals, Life Sciences & Medicine Toxicological Sciences, Volume 88, Issue 2 (2005) Pp. 505-513 http://toxsci.oxfordjournals.org/content/88/2/505.full

[14] *Air pollution and lung cancer incidence in 17 European cohorts: prospective analyses from the European Study of Cohorts for Air Pollution Effects (ESCAPE)* The Lancet Oncology, Early Online Publication, 10 July 2013 doi:10.1016/S1470-2045(13)70279-1 http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(13)70279-1/fulltext

As a result the UN's World Health Organisation has guidelines recommending that annual exposure be limited to 20 microgrammes per cubic metre for PM10, and 10 microgrammes per cubic metre for PM2.5, a reduction from the previous standard of 40 microgrammes per cubic metre for PM10 and 25 microgrammes per cubic metre for PM2.5.

Table 5 – Estimated annual cost of heating per household (selected locations) and estimated health costs compared to the cost of alternative heating (an effiecient 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]

4. Do you agree with the conclusions provided in this section? If not, please provide reasons.

As per the above response, there is clear evidence which exists to support that there is no safe level of particulate pollution and Asthma Foundation NSW agrees strongly with the conclusion that further improvements in air quality are needed below current NEPM standards if public health benefits are to be realised.

Asthma Foundation NSW strongly advocates for improved air quality monitoring in order that small particulate pollution levels can be measured and identifying when these exceed standards.

5. Are there other variables that have not been considered or not been attributed sufficient weight in the discussion?

The discussion deals with population level health impacts. Wood heater use also affects the health and lifestyle of immediate neighbours, who may not be able to enjoy gardens or outdoor living areas, dry clothes outside, and in extreme cases may have to seal doors and windows overnight and not use flued gas heaters (which draw smoky outdoor air into the house to replace the air drawn up the flue). The well established and universally acknowledged impacts on the health and lifestyle of immediate neighbours should also be noted, and planning regulations amended to ensure neighbours are consulted before wood heaters are installed in the same way as they are when alterations are made to a property. Legislation has been enacted across Australia during the past decades so that people do not have to stand next to a cigarette smoker, but people are forced to endure much higher levels of pollution when living next to a wood heater.

6. Do you agree that the current policy measures for the abatement of wood heater emissions are not successful in realising the policy objectives? Can you provide other evidence to support this?

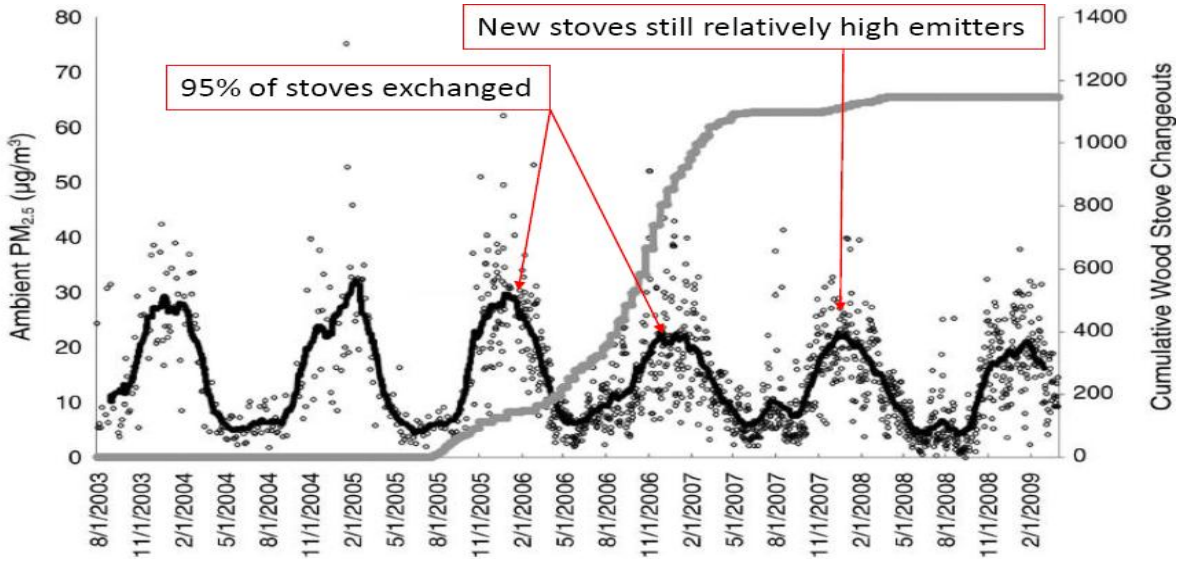
The recently published NSW EPA *Options for Wood Smoke Control in NSW* is an indictment of the current regulatory system that is governed by outdated standards, which have not been strengthened in two decades due to the compromised Standards Australia system which allows the wood heater industry to veto measures that might affect its profitability.

The NSW EPA paper reports that the 336,000 wood heaters in NSW, which would fail to meet the standards of most developed countries, produces 40- 50% of Sydney's air pollution and 35% of its particulate pollution. Conversely, the 2008 NSW draft inventory found that proportionally motor vehicle emissions are decreasing due to the strong regulatory framework in NSW and Australia, while emissions from the domestic sector are rising, in both absolute terms and as a proportion of all emissions.

The cost to health of wood smoke emissions across urban, regional and rural areas of NSW has been estimated at $8.1 billion over the next 20 years.

In Regional areas current regulation has failed to prevent even worse pollution problems. In Armidale, NSW, wood smoke concentrations were 4-fold higher within 40 metres of wood heaters, indicating that even individual wood heaters can cause serious health problems for neighbours.[20]

Table 6



Despite costing many thousands of dollars, air pollution levels are worse now than in 1999 – see graphs below. The only effective measures are those used in Launceston, Montreal, where the focus was on removing wood heaters. In Launceston," from 2001 to 2004, the number of households that used wood-burning stoves fell from 66 to 30% and consequently wintertime particulate pollution fell by 40%."

[20] Robinson, D.L., J.M. Monro, and E.A. Campbell, *Spatial variability and population exposure to PM2.5 pollution from wood smoke in a New South Wales country town.* Atmospheric Environment, 2007. **41**: p. 5464–5478.

The wood heater exchange in Libby, Montana, is a good example of the failure of the measures proposed in this CRIS. In Libby, a large proportion of old wood heaters were replaced with new ones. As shown in the graph overleaf, despite the small number of wood heaters (about 1,200) and the removal of all uncertified wood stoves, there are many days with much higher PM2.5 pollution than the Australian advisory standard of 25 ug/m^3, a level associated with significant damage to public health.

7. Which policy delivery method do you believe should be adopted by government and why?

With the health costs of a year's delay in introducing effective regulations costing close to half a billion dollars, the most important thing is to protect public health as quickly as possible from the current unacceptable situation. Whatever measures can be introduced quickly and effectively should be used to solve this problem. Commonwealth legislation, a referral of local/ State powers to a National Regulatory body and the establishment of additional NEPM standards would all be effective.

Asthma Foundation NSW believes that the latter measure could be particularly effective. For Particle Pollution, the Ambient Air Quality NEPM standards are currently based on daily PM 10 values. The NEPM review in 2011 recommended that a NEPM standard be introduced for PM 2.5. The new World Health Organisation's recommendations for PM 2.5, which were recently recalibrated following the publication of one of Europe's largest study on the effects of particulate matter on health (see footnote 14) should be adopted as NEPM standards. These require that the daily PM2.5 remain below 10 µ/m3 and the annual daily average below 8 µ/m3.

As with PM10 a maximum number of exceedences (eg 5 per year) should be set and it should be a requirement to investigate and report the reason for each exceedence
As with PM10 a maximum number of exceedences (eg 5 per year) should be set and it should be a requirement to investigate and report the reason for each exceedence.

8. Do you agree that the policy measures listed for the abatement of wood heater emissions will be successful in realising the objectives? If not, please provide your reasons including supporting evidence.

No, we do not believe the suggested policies will be effective in reducing wood heater emissions . The only effective measures are those used in Launceston and Montreal, where the focus was on removing wood heaters. In Launceston, from 2001 to 2004, the number of households that used wood-burning stoves fell from 66 to 30%. Wintertime particulate pollution fell by 40%."

The stove exchange in Libby, Montana, is a good example of the failure of the measures proposed in this CRIS. In Libby, Montana a large proportion of old wood heaters were replaced with new ones. As shown in the graph overleaf, despite the small number of wood heaters (about 1,200) and the removal of all uncertified wood stoves, there are many days with much higher PM2.5 pollution than the Australian advisory standard of 25 ug/m3, a level associated with significant damage to public health.

9. Do you believe that the "nudge" programs will be helpful in reducing wood heater emissions?

'Nudge' programs will only be useful as a supplement to more fundamental interventions. Page 37 of the CRIS document summarises the key reasons education programs may be "useful" but should not be at the centre of any emission-reducing policy.

"One disadvantage of incentive schemes is the difficulty in directing the incentives to the people who would otherwise not have replaced their non-compliant wood heater and avoiding the "free rider effect."

Also, while they have the potential to deliver significant outcomes they do rely on voluntary participation."

Anti-smoking programs are the most successful example of harmful emission reduction in recent years and while education/quit campaigns were useful in supporting the campaign it was primarily driven by legislation that has progressively banned smoking from public areas. The key reason for this is that Australians respond better to legislation than education. Once legislation is enacted and a system of fines put in place, the law is generally obeyed. Wood smoke legislation should follow this lead if it is intended to be effective rather than cosmetic.

These programs are not particularly different to the 'social marketing' that has been tried in many regional centres. Most people think that governments would have banned wood heaters many years ago (just as they did lead in petrol and asbestos sheeting) if the research showing that wood smoke caused 12 times as many cancers as the same amount of cigarette smoke were true. People will not change their behaviour until they understand the true health effects of wood smoke.

There is ample evidence that education/awareness programs have failed. A 1999 survey in Armidale reported 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, 24% said it was true, and the remainder were unsure.[21] This was despite a $46,000 wood smoke education program by the NSW EPA in Armidale a couple of years earlier.

Little store can be placed by education programs because key messages such as; wood smoke contains the same and very similar chemical to cigarette smoke, that Ames tests on bacteria and tumour initiation tests on mice show wood smoke 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 – even though they are scientific fact.

10. Are there other measures that are not listed in the document that should be considered?

Asthma Foundation NSW considers that the CRIS should have adopted the three main recommendations made in The NSW Wood smoke Control Options report that together would reduce wood smoke health costs by 75% (see Table 4). These were: removal of existing heaters that do not meet a health-based standard when houses are offered for sale, not allowing the installation of new heaters that do not meet a health-based standard and taxes and licencing fees to cover the cost of wood smoke-reduction programs with assistance for people whose health or lifestyle has been affected by wood smoke.

Why do none of the 9 options offered to reduce wood smoke not include a complete ban on the new installation of wood heaters? The third paragraph of the Executive Summary states: "…As poor wood heater operation is usually the main reason for excessive emissions, improvement in technology may be appropriate to ensure emissions are less dependent on operator skill."

[21] Khan, L., *Particulate Air Pollution in Armidale*. 2002, PhD Thesis, Univ. New England, Armidale, NSW.

Table 7 - Estimated health benefits and costs of wood smoke 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: EconomicAppraisal of Wood Smoke Control Measures[3]

Also the most successful wood smoke reduction programs in Libby, Montana and Launceston, Tasmania were a result of a reduction in the numbers of wood heaters in use rather than any improvements in their operation (even though the latter may have improved also). This was predicted by modelling made by the CSIRO which estimated that the NEPM limit for PM10 of 50 ug/m3 would be reached when total usage in the valley fell to 5,000 wood heaters and that the PM2.5 limit of 25 ug/m3 would be reached when the numbers fell to 2,000 wood heaters.

Consumers should be encouraged to use the very low emission combustion of wood via pellet heaters, whose emissions are below 1 g/kg and with negligible start-up emissions. This could be done by allowing the installation of new pellet heaters, but no new wood heaters. In the Canterbury Region of New Zealand, only low emission, high efficiency wood heaters may be installed and only then as a replacement for an existing wood heater. This policy alone resulted in a 70% reduction in PM10 emissions in Christchurch between 2002 and 2009.[22]

Consideration should also have been given to setting a particulate and wood smoke emission reduction target for whichever option is adopted, instead of setting a largely aspirational target of 3- 18% over 20 years, which has no set targets.

In addition setting a 5 year review of the policy would have kept open the option of a complete ban on new wood heater installations if appropriate targets had not been met.

For Particle Pollution, the Ambient Air Quality NEPM standards are currently based on daily PM 10 values. The NEPM review in 2011 recommended that a NEPM standard be introduced for PM 2.5. The current UN World Health Organisation recommendations for PM 2.5 should become NEPM standards. These require that the daily PM2.5 remain below 10 µg/m3 and the annual daily average below 8 µg/m3.

As with PM10 a maximum number of exceedences (eg 5 per year) should be set and it should be a requirement to investigate and report the reason for each exceedence.

[22] Scott, A and Scarrott, C (2011) Impacts of residential heating intervention measures on air quality and progress towards targets in Christchurch and Timaru, New Zealand. Atmospheric Environment 45 (2011) 2972-2980.

PM2.5 should be monitored in all cities and towns of Australia, perhaps with populations of at least 10,000 people. It would also be useful if residents could access current PM2.5 levels in their local regions, particular in areas known to have temperature inversion layers or wood smoke. This information is already available in Launceston and some other cities in Tasmania but it is not yet available in similarly affected regions like Armidale and Tuggeranong.

Reform of the constitution of Standard Australia – the regulatory body that is supposed to monitor and ugrade the emissions system without a Parliamentary inquiry – is critical. Standards Australia has patently failed in its duty to take perceptive action to limit harmful emissions – as evidenced by current Australian emissions standards which are a decade behind other developed nations.

The inaccuracies, which were identified in 2008, in the National Pollutant Inventory (NPI) which under-estimates particle emissions from wood heaters 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. This would enable the public to understand how much pollution these heaters truly produce.

11. Which of the listed policy combinations do you favour in addressing a reduction in wood heater emissions? Why do you favour these measures?

The policy combinations proposed in the CRIS can be likened, instead of banning asbestos sheeting (which now has universal support) to introducing regulations to reduce the maximum allowable amount of asbestos in sheeting by 33% (policy combinations 6 to 8) by 2016 to 2018, or by 67% by 2020 (policy combination 9). It is not made clear why the most effective Combination 9 will have to wait six years to be introduced when all scientific evidence points to an urgent need for action now.

Government's first priority should be to protect public health. The first step should therefore be to introduce the 3 most cost effective measures in Table 2 as soon as possible, while more permanent regulations are being developed. The permanent regulations should be formulated to deliver similar or better health benefits than the 3 most cost effective measures listed above.

12. Are there policy combinations that you would not support? Please provide reasons.

Asthma Foundation NSW would suggest not allowing the installation of any new heaters with estimated health costs of more than $500 per year, except as replacements for more polluting heaters.

Any combinations involving options 1- 6 are largely ineffective given the widely acknowledged scale of current problem. They are simply too weak to consider, given that Australia already lags way behind the world standards on wood heater emission control.

13. Do you believe the base case has been correctly identified, or are there other variables that need to be considered?

Curiously Table 7.2 of CRIS does not for some reason provide an estimate of the costs of the base case, but, as an estimate of $8 billion in health costs has been recently published NSW, the cost of the base case would be about $20 billion for Australia as a whole. More importantly, under the precautionary principle, the true base case is not '"business as usual," but not allowing new heaters to be installed unless they conform to an acceptable health-based standard for real-life emissions.

14. Have all health, environmental, economic and social impacts been identified? If not, please suggest others that need to be included. Has sufficient weight been given to these impacts within their relationship to the policy options being proposed?

The health and lifestyle impact on neighbours has not been considered, nor their rights in being consulted about the installation of any devices that will affect their health and lifestyle. Consideration also needs to be given to the impact of people moving out of town to avoid unhealthy pollution levels, and the need to seal houses to prevent the ingress of pollution.

People can choose not to smoke tobacco products and they can actively avoid being exposed to other people's tobacco smoke. Government regulations in Australia are very good at assisting people to not be exposed to tobacco smoke, by banning smoking in confined public places. However, a non-smoking Australian living in a region with high particle pollution levels, is unable to escape that pollution and the associated risks without moving to a different location. This fact, together with the absence of a safe threshold level of exposure to wood smoke, provides a powerful reason as to why Governments should regulate the burning of wood to protect the population.

There is another important precedent. PM2.5 pollution from cars and sports utility vehicles has been slashed by the development of new standards. Although adding about $980 to the price of the average diesel SUV, the latest Euro5/6 standards are considered well worth the $1.5 billion saving over the next 20 years in health costs for Australia. A SUV travelling 20,000 km per year must emit less than 0.1 kg PM2.5.

Should the same standards not be applied to wood smoke given that these heaters are predicted to cost NSW $8b in health bills over the next 20 years?

15. Have all key assumptions been correctly identified and included in the analysis? If not, please suggest others that need to be included.

The key assumptions depend on the base case. An incorrect base case implies that all key assumptions need to be revised once the fundamental flaw of an incorrect base case has been remedied.

What assumption, for example, is behind the need to delay the implementation of a limit of 1.5 g/kg (introduced in 2005 for all urban areas in NZ) to 2020? The NZ industry quickly responded by developing dozens of models to satisfy this limit – so there appears to be no possibly justification for assuming that such a delay would be necessary in Australia.

16. Do you agree with the conclusions? If not, please provide reasons.

There is no doubt that a National Regulatory Approach to wood heater emissions is required. However, all the policies outlined in this CRIS and many more have been tried in NZ.

NZ has an effective audit system. Otago councils also required all heaters rated more than 1.5 g/kg or efficiencies less than 65% to be removed by 1 Jan 2012. There has, however, been little improvement in air quality, with Cromwell (pop 4896), Alexandra (pop 4824), Arrowtown (pop 2400) and Clyde (pop 900) - all small towns will little or no traffic or industry – having respectively 29, 42, 24, and 7 excedences of the PM10 standard in 2012, compared to 33, 41, 25 and 29 in 2011
http://cleanairnz.com/2013/04/07/hey-central-otago-whats-plan-b/

Indeed, the results from Launceston suggest that the estimates in Table 2.3 of the CRIS are overly optimistic. Measurement of real-life emissions in Launceston took place after many years of education on how to operate heaters correctly. All households volunteered for the testing and knew their emissions were being measured. There was no evidence that heaters were "allowed to smoulder overnight; in contrast they appeared to be refuelled periodically throughout". Getting up in the middle of the night to refuel the heater cannot merely be considered "good" operation, but a superlative effort!

This, combined with the continued exceedences in NZ, despite what appears to be more stringent regulations than proposed by the CRIS, suggests that the proposed measures are a totally ineffective response to the very serious threat to health posed by wood smoke exposure.

17. Can other conclusions be made based on the outcomes of this analysis?

That the National Regulatory Approach should be to implement, as quickly as possible, the three policy options deemed to be most cost effective in the more comprehensive scoping study of wood heater emissions carried out in NSW. This needs to be carried out in conjunction with a comprehensive program to explain the health effects of wood smoke to all current and potential future wood heater users. Most people who truly understand the nature of wood smoke, including the carcinogen and toxins it contains, the proven health problems caused by these carcinogens and toxins, will not want to use wood heating.

At the Newcastle Hearing of the *Senate Inquiry into the Health Effects of Air Pollution*, Prof. Higginbotham explained that breathing air at the PM2.5 standard of 20 micrograms per cubic metre (sic) was equivalent to smoking 3 cigarettes per day. The above measurements for Libby, Montana (and Launceston, Tasmania, where the CRIS estimates that only 15% of households have wood heaters, virtually all of which comply with the Australian Standard) still result in many days with wintertime PM2.5 measurements above 25 ug/m3. Some people are concerned about allowing people to smoke cigarettes near outdoor playing fields. If people knew the truth, many more would be concerned that the presence of a single wood heater emits as much PM2.5 per hour as in the smoke from 500 cigarettes, with carcinogenic potency of perhaps 6,000 cigarettes per hour.

Senator Di Natale commented: "So what you are getting at really is that, while we might have the threshold (i.e. NEPM limit for PM2.5), there should be existing targets as well that go beyond just an arbitrary cut-off. In fact, there might be low-hanging fruit there whereby we might be able to make some good health gains by reducing particulate matter beneath the threshold." Most people who understand the wood heater-cigarette comparison are likely to support much stricter measures to reduce wood smoke, e.g. not allowing new heaters to be installed until a satisfactory health-based standard has been developed, annual licencing fees and, before houses are offered for sale, requirements to remove all wood heaters that do not comply with the new health-based standard.