Consultation regulation impact statement for reducing emissions from wood heaters

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The Clean Air Society of Australia and New Zealand (CASANZ) is a non-government, notfor-profit organisation that brings together professionals working across a broad range of air quality management fields. Formed in 1966, the Society's members have been intimately associated with the evolving management of air quality in Australia and New Zealand. Various members of the Society have worked in all levels of government, conducted research in Universities and the CSIRO, and worked as air quality consultants. The Society performs important roles in information and technology transfer and training. The Society's Journal *Air Quality and Climate Change* has played an essential role in disseminating information about air quality with a strong focus on Australian and New Zealand issues for almost 50 years. Over the past decade, in particular, the Journal has published the outcomes of many important research projects addressing wood heaters and residential wood smoke. The Society's goals are summarised in Appendix 1.

CASANZ welcomes the opportunity to comment on this *Consultation Regulation Impact Statement (CRIS)*. We have canvassed the views of our members and prepared this submission on the basis of the input received. Several of our members attended the Council of Australian Governments Standing Council on Environment and Water public meetings held around Australia in June.

In our submission, we include comments relating to the nine policy actions outlined in the CRIS based on specific points raised by members. We have provided brief answers to the 17 questions posed in the CRIS. We believe that the range of policy actions under consideration should be extended to include some restrictions on the installation of wood heaters in new houses in some regions. This matter is discussed in more detail in the section headed 'Detailed discussion' (Parts A and B) of our submission.

General issues

- 1. The intent of the review and objective of reduction of smoke emissions from wood heaters is strongly supported.
- 2. The consultation document is clear, well structured and provides a good overview of the status of the wood heater industry and wood heater emissions in Australia in 2010.
- 3. However, the Australian Bureau of Statistics survey, published in 2011 and acknowledged in the foreword, suggests a significant reversal in the declining popularity of wood heaters, with numbers increasing for the first time in about 15 years. This is discussed in more detail below.
- 4. Another significant study that was published too late to be included in the CRIS is the work by Johnston *et al.* (2013) in Launceston, Tasmania. The study examined mortality figures in Launceston when smoke levels were high (1994-2000) and compared them to the years following the intervention to reduce wood smoke (2001-2007). The research concluded that there were statistically significant reductions in mortality as a result of the efforts to reduce wood smoke from residential heating. In this relatively small population of 70,000 there were about 30 fewer deaths per year. There are many towns and small cities in Australia that have high winter wood smoke levels. The experience in Launceston is likely to have wide application across the country. Unfortunately, particle monitoring in Launceston suggests concentrations are rising again after many years of decline, presumably because more people are using wood heaters.
- 5. CASANZ strongly supports the suggested measures to improve compliance with standards. Unenforced standards provide an economic advantage to manufacturers that do not bother to comply. The 2004 audit of popular Australian wood heater models showed widespread, serious, non-compliance with standards. There were no penalties or recalls; in fact the names of the models that did not meet the standards were never released. There has been no follow up audit. This is part of the reason for current policies failing to achieve their objectives (see Point 6 below).
- 6. The CRIS (page 32) provides a useful summary statement, a view shared by CASANZ:

"In summary, the current regulatory and policy framework to control wood heater emissions in Australia has failed to meet its objectives, with emissions from both new and in-service heaters contributing significantly to ambient levels of particulates and associated health impacts. This 'regulatory' failure presents a prima-facie case for further government intervention, to either amend existing policies and programs and/or to introduce new requirements."

7. The CRIS presents and analyses the benefits and costs of nine options for managing wood smoke. We feel that two additional options should be included for consideration. Non-uniform emission limits for new wood heaters (i.e. regions with air quality problems should be encouraged to apply local restrictions on which types of wood heater could be installed) and restrictions on installation of wood heaters in new houses in regions with PM_{2.5} concentrations exceeding $25\mu g/m^3$ (24 hour average) more than five (5) times per year. These are discussed in more detail below.

- 8. Although the CRIS is an environmental one aimed at the impacts of wood heater emissions, it also needs to address issues of equity and social justice, as many current users of wood heaters especially those in rural and outer-urban areas, would not have the ability to access and afford alternative forms of home heating.
- 9. Social justice issues also arise when considering the air quality problems experienced by households subject to smoke entering their home from nearby wood heaters. In modern Australia people expect, and should be able to enjoy, clean air in and around their homes.
- 10. The problems of smoke from wood heaters have been well documented in Australia for three decades. In that time, there have been major advances in reducing air pollutants from transport and industrial sources, but wood smoke from residential heating seems to have slipped under the radar. There is little difference in the technology of wood heaters sold in the 1980s with those sold now.
- 11. The problem of localised smoke, where one poorly operated or poorly installed wood heater creates very unhealthy and unpleasant conditions for one or more nearby homes has not been adequately addressed. It is mentioned in the CRIS (page 109) that even where regulations are complied with smoke may still be a nuisance. The term 'nuisance' masks the seriousness of local wood smoke pollution. People experiencing this most unpleasant smoke exposure report sickness, including children's asthma attacks, but still cannot get satisfactory solutions. This is discussed in more detail below.
- 12. Another potentially serious problem linked to wood heaters, but not addressed in the CRIS, is indoor air quality. Smoke spillage when refuelling a wood heater can lead to high particulate concentrations in living areas. Perhaps this is outside the scope of the CRIS, but it needs to be acknowledged and programs developed to research the extent of the problem and develop solutions.
- 13. It is difficult to understand why there is public health concern over passive tobacco smoking, with resulting legislation, but no similar approach to wood heater emissions. Surely, it does not require a campaign similar to that of the anti-tobacco campaigns from NGOs to effect change.
- 14. One suspects that if maximum ground-level concentrations of many of the pollutants from wood heaters were modelled along the lines of modelling for industrial sources the levels would be well above permitted concentrations.
- 15. One feature which should be included in all wood heater usage is a requirement that the installation of flues/chimneys provide a discharge point which is above the zone of turbulence of the dwelling.
- 16. The emissions from wood heaters are more than just particles. More attention must be given to PAH, benzene, formaldehyde and CO emissions.
- 17. We would conclude that based on the benefit to cost ratios (probably underestimated) in the CRIS; there is a very strong case for a program of more stringent requirements and effective enforcement of wood heater emissions.

Responses to questions

In this section, we provide brief responses to most of the questions listed in the CRIS.

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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.

The firewood industry is a dispersed, rural industry with many small operators, many self employed. It is desirable to provide this type of work opportunity to those in the work force that enjoy hard, outdoor work with a large degree of autonomy. It provides a useful transfer of money from the cities to the rural areas. Using an annual firewood consumption of four (4) million tonnes, half of which is purchased, and an assumption that it requires one-manday to collect, split and deliver four (4) tonnes of firewood, the firewood supply industry employs the equivalent of about 2,250 full-time jobs. Many people in the firewood industry work on a part-time or casual basis, so more than 2,250 individuals are involved.

Manufacturing employs 1,025 people (the figure provided in the CRIS). Other direct employment includes retail and heater installation. We estimate this employs another 300 to 400 full-time equivalent people. Including other jobs, such as transport and heater testing, we think it is unlikely that full-time equivalent employment exceeds about 5,000. We do not think this is trivial, in fact it is a useful part of the employment mix in Australia, but it is only about half the number estimated by the industry.

We do not think that the AHHA (as the peak industry body) should be responsible for the wood heater certification program. This should be carried out by an independent organisation. We are particularly disappointed that the AHHA decided to remove information about the emission test results for all certified heaters from their website. This makes it impossible for consumers to select heaters with lower emissions and is one reason why the heater certification program is ineffective.

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

As mentioned above, the heater certification program should be independently administered. It should be transparent and should provide useful information to the public. It is also essential to regularly audit a number of wood heater models to ensure compliance with emission standards. This too must be a transparent process so that owners of wood heater models that are found to be non-compliant can expect their heater to be replaced with a compliant model.

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

We consider wood heater emissions to be the most significant source of air pollutants in winter in many regions of Australia.

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

We do agree with the summary of this section of the report. Although there is no formal NEPM requirement to monitor population centres with fewer than 25,000 people, there is growing evidence that high particle concentrations occur in many smaller towns. $PM_{2.5}$ reporting levels are exceeded far more frequently than the PM_{10} limit. This needs to be taken into account.

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

As mentioned above, $PM_{2.5}$ is a significant issue when wood smoke is present. Wood smoke is almost all smaller than $PM_{2.5}$ (mostly smaller than $PM_{1.0}$). PAH (including benzo[a]pyrene), benzene, and formaldehyde are also significant in wood heater emissions. Modelling suggests that regions with a high proportion of wood-heated homes are unlikely to meet national reporting limits for benzo[a]pyrene.

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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?

We strongly agree with this view. There is much evidence to support this:

- The 2004 audit referred to above showed more than half the heater models checked did not comply with the standard. Non-compliant heater models undergoing full emission tests had emission rates about 3.5 times higher than their 'certified' values.
- Many people are suffering very poor air quality in their homes in winter because of 'nuisance' smoke from nearby wood heaters.
- Wood-smoke is contributing to exceedances of the $PM_{10} 50\mu g/m^3$ NEPM limit.
- $PM_{2.5}$ concentrations often exceed $25\mu g/m^3$ contributing to warnings for people with respiratory complaints.
- With no lower limit for adverse health effects of fine particles, it is wrong to rely on a PM_{10} limit of $50\mu g/m^3$ as a measure of meeting public health goals.
- The most recent ABS survey suggests wood heater numbers are increasing again, this is showing up in increased smoke concentrations in cities such as Launceston. It is likely that all regions with an increase in wood heater numbers will show decreases in air quality with inevitable increases in health costs.

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

A national approach is required.

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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.

As discussed below (Section A), we feel that non-uniform controls are essential (with some areas requiring more stringent emission limits for new wood heaters and some areas where wood heaters are not permitted in new homes).

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

Incentive and educational programs have had limited success over the past 30 years. It would be dangerous to think they might provide a solution by giving them a new name. By all means, education and incentives should be applied, but with things apparently getting worse, a much more interventionist approach seems necessary.

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

See our comments in Section A below.

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

Some members have indicated a preference for Option 7. Others feel that the range of policy options does not go far enough and that measures addressed in Section A below are required.

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

We support the national auditing of wood heaters component of all policies (it should be independently carried out and transparent). We do not support other aspects of policies 1 through to 6, because we do not feel they are sufficiently different from the approach to date, which is not successful.

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

The base case has been shown to be incorrect by the 2011 ABS survey referred to above. It really shows that it is not possible to extrapolate historical data of this type. There are too many external issues that could significantly influence householders' choice of heating. If, for example, it was assumed the ABS finding of an annual increase of 30,000 wood heated homes (between 2008 and 2011) continued, the peak number of wood heaters in use in Australia (which occurred around 1994) would be exceeded in less than a decade (Figure 1).



Figure 1. ABS wood heater data (secondary wood heaters use is an estimate)

If the growth continued for 20 years, there would be 54 per cent more wood heaters in use in Australia and none of the policy options shown on page 4 of the CRIS would be effective enough to produce any reduction in total 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?

Two recent publications by Johnston *et al.* (2013) and Noonan *et al.* (2012) report measured improvements in community health (mortality and children's respiratory illness respectively) in communities where wood smoke from residential wood heating has been reduced. These are important additions to the growing scientific and medical evidence that exposure to urban wood smoke is indeed a significant health risk.

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

We feel that localised smoke issues have not been adequately addressed. It is not reasonable to just suggest this is a local government issue and so outside the scope of this CRIS.

Indoor air quality issues associated with smoke spillage into people's homes might be outside the scope of this CRIS, but it needs to be addressed somehow.

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

We do not agree that the business as usual case leads to an 18 per cent reduction in emissions over 20 years. This is because of the new evidence (ABS survey published in 2011) now available.

Nor do we agree that a 1.5g/kg limit on new wood heater models would require extensive research by industry. Many of the current generation of wood heaters could meet this limit

by sacrificing the slow burn option. One must ask just how much convenience a wood heater owner should be allowed (i.e. the convenience of not lighting the wood heater each morning) if the consequence is unacceptable air quality shown to be costing the community many millions of dollars each year in health costs.

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

We feel that current approaches to managing wood smoke from residential firewood in Australia have not been successful. Greater intervention by government is required.

Detailed discussion

A. Additional Policy Options

A.1 Air quality is obviously not uniform across the country. Some regions experience poor dispersion, some regions include many sources of air pollutants. It seems logical, therefore, to develop policies that provide for more stringent regulation of wood heaters in some regions. Armidale provides one example of this; in Armidale more stringent emission limits are set for new wood heaters installed in defined parts of the municipality. CASANZ believes one policy option that should be included for discussion is national support and encouragement for local bylaws which only allow the cleanest burning wood heater models to be installed.

It is important that statements such as "In 2008, the EPHSC agreed on the need for a nationally consistent approach to wood heater emissions management" (page iii) should not be interpreted as a discouragement to local government to take extra action where winter wood smoke is a problem. It is possible that some sections of the industry might use this argument in an attempt to prevent local action. It needs to be remembered that the air NEPM aims for air quality that provides "equivalent environmental protection". A statement should be included in any final document making it clear that more stringent local requirements are not only permitted, but may actually be required under national legislation.

We suggest a tenth policy option along the lines:

National Approach –A policy of providing national technical assistance to local government regions seeking to improve local air quality through tighter regulation of wood heater emissions.

A.2 Regions with winter $PM_{2.5}$ concentrations exceeding $25\mu g/m^3$ (24 hour average) should be encouraged to prohibit the installation of wood heaters in new homes. New homes should be energy efficient making alternative heating options financially acceptable.

It would be counterproductive to allow new sources of $PM_{2.5}$ into regions with air quality that is already having an adverse impact on people's health. In New Zealand, the clean air legislation specifically prevents permits being issued to install new wood heaters in areas that do not meet national air quality standards unless there is an

emissions offset. This seems sensible and might be a more logical, though heavier handed, approach than simply encouraging local government to act.

We suggest an eleventh policy option along the lines:

National Approach – In air-sheds where $PM_{2.5}$ concentrations exceed $25\mu g/m^3$ (24 hour average) in winter, wood heaters and open fireplaces should not be permitted in new homes.

B. Localised Wood Smoke

Problems of neighbour polluting neighbour occur for several reasons.

- Short flues: incorrect (illegal) installation of wood heaters (flues must extend a minimum of 4.6m above the hearth). If the flue of a wood heater is less than 4.6m, the heater will draw poorly, meaning there is less oxygen in the fire and more smoke. A national policy giving local government the power to require any flue less than 4.6m to be removed and replaced with a flue that complies with the building regulations is desirable.
- Local topography, multi-story buildings and vegetation may all contribute to poor dispersion of smoke from a wood heater causing unacceptable conditions in neighbouring properties. The building regulations (through AS/NZS2918) require an installer to ensure that "there is no forseen risk of penetration of flue gases through nearby windows or other openings, fresh air inlets, mechanical ventilation inlets or exhausts, or the like" (Clause 4.9.1 (f) of AS/NZS2918:2001). In effect, this means that there will be situations where a wood heater cannot be installed. The problem is that a homeowner may purchase a wood heater and insist the installer put it in even where there is clearly a risk of smoke impacting on neighbours. This existing regulation needs much stricter enforcement.
- If the owner of an offending wood heater is not cooperative it becomes very difficult for the family experiencing smoke problems to get action. The comments from two of our members sum up the problem well:

"Those of us who are unfortunate enough to live next door or very close by a "modern" allegedly AS4013 compliant wood heater receive a disproportionately high concentration of PM2.5s, concentrations so high that we must seal our doors and windows, turn off our own gas heaters (externally flued) and remain indoors for much of the winter to try and protect our respiratory health. Our concern is that any regulations or targets for heater emissions will be based on average NEPMs for large regions or zones and these will provide little protection for us unfortunates who live in the highly polluted micro environment adjacent to a heater."

"It appears that it is considered acceptable for a householder to subject their neighbours and the general population to pollution levels which would not be accepted if the wood heater were operated by a commercial enterprise."

- The problem of localised wood smoke is compounded because of the need for authorised officers to see excessive smoke (in some cases the smoke must be seen impinging on neighbouring properties), give a written warning to the offending household and then see excessive smoke again. When the worst smoke emissions often occur in the evening or early morning (or any other time after dark) it is almost impossible to get someone there to observe the smoke.
- Few measurements have been made of localised wood smoke concentrations. It is known that fine particle concentrations over 5,000µg/m³ can occur in wood heater smoke plumes. Experiencing such high concentrations for just 15 minutes would give a 24-hour average exposure above 50µg/m³.
- A national program providing technical assistance and the loan of equipment to local government to better deal with smoke 'nuisance' complaints is needed. Use of a particle counter (with recording provisions) and a security camera could provide evidence of the source and magnitude of smoke from a nearby wood heater. With this information it would be much easier to take action to prevent on-going smoke problems.

References

- Johnston F. H., Hanigan I. C., Henderson S. B. and Morgan G. G. 2013 'Evaluation of interventions to reduce air pollution from biomass smoke on mortality in Launceston, Australia: retrospective analysis of daily mortality, 1994-2007' *BMJ* 345:e8446 doi
- Noonan C. W., Ward T. J., Navidi W. and Sheppard L. 2012, 'A rural community intervention targeting biomass combustion sources: effects on air quality and reporting of children's respiratory outcomes' *Occupational and Environmental Medicine* 69:354-360

Appendix 1

Clean Air Society of Australia and New Zealand

The goals of CASANZ are presented on the website at: <u>www.casanz.org.au</u>. They are:

- 1. The objects of the Society are to promote the protection of the environment, through advancement of knowledge and practical experience of environmental and air quality science and management.
- 2. CASANZ is an organisation which gathers and distributes the experience and knowledge of its members, to benefit society members and the public.
- 3. CASANZ provides lectures, exhibitions, public meetings and conferences as a forum to expand knowledge of environmental matters, especially air quality, including causes, effects, measurement, legislative aspects and control of pollution.
- 4. CASANZ develops liaisons with organisations with similar interests in Australia and New Zealand, as well as other countries.
- 5. CASANZ prints and publishes papers, periodical articles, books and information leaflets for the benefit of its members and the public. An example is its Journal, *Air Quality and Climate Change*.
- 6. CASANZ may provide scholarships, bursaries, monetary grants, awards and prizes to encourage the study and presentation of relevant subjects and disciplines in air quality and climate change.