

My name is [REDACTED], and I want my name and address to remain confidential but not my submission. I currently live at [REDACTED], New Zealand, but am formerly of both [REDACTED] and [REDACTED] South Australia. I will be returning to live in Australia soon. Whereabouts I choose to live is largely dependent on air quality and how close the nearest wood heater will be. Currently I live rurally in New Zealand and have not been able to live in any town or suburb in New Zealand because of wood smoke issues.

My submission is about the Consultation RIS for reducing emissions from wood heaters.

I believe I have a valuable contribution to make because of my experience of being smoked out of my house in suburban Adelaide by wood smoke, the inadequate response I got from my city council at the time, [REDACTED]
[REDACTED]

Specifically I want to comment on the AHHA's submission to Standards Australia to change AS4012 and AS/NZS 4012 to 2.5 grams of PM₁₀ particulate matter emitted per kilogram of fuel burnt.

I agree that current standard of 4.0g PM₁₀ per kg is inadequate and should be tightened, but the figure of 2.5g/kg PM₁₀ is completely inadequate, and [REDACTED] further delay proper regulations for controlling wood smoke pollution which will only lead to further unnecessary community cost, sickness and death.

I will argue that AS/NZS4013 be tightened considerably and that the National Environment Protection Measure for Ambient Air Quality for PM₁₀ particulates of 50 micrograms per cubic metre (50 µg/m³) in outdoor air averaged over a 24-hour period be tightened at the same time.

Firstly wood smoke is incredibly toxic. It is not widely understood by the general public just how poisonous wood smoke is, what its chemical constituents are, and what medical effects those chemicals have on people's health. The chemical constituents are outlined in Table 1 in the Appendix from the US EPA. The table doesn't detail the types of cancers that each chemical produces, but benzene for instance (which woodheaters produce 5 to 6 times as much as a petrol-engined cars do) causes leukaemias. This is an addition to the oesophageal, throat, mouth and lung cancers and the stroke, cardiovascular diseases, bronchial diseases, emphysema and asthma caused by the other chemicals .

There are no proven safe levels of PM₁₀ or PM_{2.5} particulate matter. The PM₁₀ level of 50 µg/m³ figure is not set at any proven safe level. 50 µg/m³ is set an unsafe level. If a safe level is ever found it will be considerably less than 50 µg/m³.

Wood heaters are not at all clean. All wood burners make toxic pollution. It is unavoidable. Wood heaters currently meeting AS/NZ4013 of less than 4.0g per kg of fuel only meet them in laboratory conditions. Studies in Australia and New Zealand (see <http://www.environment.gov.au/atmosphere/airquality/publications/pubs/emission-factor.pdf> and <http://ecan.govt.nz/publications/Reports/air-report-emissions-residential-wood-burning-appliances-nz-000805.pdf>) have both shown that under real world conditions wood heaters produce considerably more particulate emissions than they do under laboratory conditions and are producing anywhere from 10 to 21 grams of PM₁₀ particulates per kilo of fuel burnt. i.e. so called "clean" burners are actually producing heavy loads of pollution.

Towns in Otago now have the strictest rules for governing the emission standards of wood heaters. Since January 1st 2012 only wood burners rated less than 0.7 grams/kg may be used in Arrowtown, Alexandra, Cromwell or Clyde. But because real world emissions are in reality many times more dirty than under laboratory conditions no improvement has been seen in measured air quality from 2011 to 2012. Comparing the 2011 to 2012 figures for those towns it is obvious that the policy of using these so called "ultra-clean" burners has completely failed. After all of the woodburners had been switched out in Arrowtown for instance the number of days in excess of the ambient air quality dropped by 1 day from 25 to 24, and the peak level detected actually went up from 115 to 147 $\mu\text{g}/\text{m}^3$. In Alexandra exceedences actually went up. If the policy worked then there would be zero or at most one exceedence of ambient air quality annually. Yet there was virtually no change and all four towns remain both chronically and acutely polluted.

	Alexandra	Arrowtown	Balclutha	Clyde	Cromwell	Dunedin	Lawrence	Milton	Mosgiel
This Week's # Days >50	0	0	0	0	0	0	0	2	0
This Year's # Days >50	41	25	4	29	33	14	3	35	8
2011 Maximum	144	115	93	107	100	70	57	137	94
2010 Maximum	127	101	71	109	132	62	54	119	103
Highest on Record	193	168	71	109	132	86	57	145	108



Figure 1 - Otago 2011.

	Alexandra	Arrowtown	Balclutha	Clyde	Cromwell	Dunedin	Lawrence	Milton	Mosgiel
This Week's # Days >50	1	0	0	0	1	0	0	2	0
This Year's # Days > 50	42	24	12	7	29	1	2	39	0
2012 Maximum	94	147	73	68	91	71	65	143	38
2011 Maximum	143	116	94	107	92	70	57	114	95
Highest on Record	193	168	94	109	132	86	57	145	108

Figure 2 - Otago 2012.

It doesn't matter at all what a wood burner is rated at, it will have real world emissions way, way higher. 0.7g/kg heaters emit between 10 and 21 g/kg in the real world. 4.0g/kg heaters emit between 10 and 21g/kg in the real world. 2.5g/kg heaters emit between 10 and 21g/kg in the real world. Because of this all regulations based around laboratory ratings of wood heaters are deeply flawed. Such regulations will fail in the real world, and waste valuable time before regulations that will work can be brought in.





What are proper wood smoke pollution controls? Personally I believe complete prohibition is needed, not just in towns and suburbs, but also in closely settled rural districts.

Firstly a proper limit of wood smoke in ambient air should be set, which reduces the annual death toll to as close as zero as possible. The present figure in New Zealand is 1100 premature deaths caused annually by particulate pollution, of which wood smoke makes up the majority cause. (Similar per capita death tolls will exist in Tasmania and badly polluted places like Canberra and Armidale and other less polluted places in Australia will have smaller death rates.) This means a maximum of 15 or perhaps 20 μg per m^3 should be allowable, maybe even less. $\text{PM}_{2.5}$ s should also be considered instead of being presently ignored. Environmental sources such as salt and dust laden winds, and vehicle emissions would easily take up any allowance so there is no space for wood burning.

Then real world emissions for solid fuel burners which can lead to no exceedences of the stricter ambient air quality limits should be set, and they must be set fairly. All homes should not pollute more than their fair share of any limit. This will mean, depending on the airshed real world emissions in the order of 0.05g/kg of dry fuel and probably less. Technologically emission levels like that are impossible for manufacturers to meet without burning the wood at temperatures that would melt steel, or have incredibly expensive scrubbers. Essentially there is no promise of any technological solution. It is a waste of time to pretend that there could be a soon to be brought to market real world clean wood burner.

i.e. There is no way that any regulations could be set where woodburners are legitimately used that didn't lead to air pollution. We have to face facts and that is that wood burning is an outmoded technology. It is as dead as the dinosaurs. Perfectly adequate and clean forms of domestic heating exist, such as piped or bottled gas, and air-based or ground-based heat pumps, none of which have pollution in and around the home of any magnitude anywhere near the pollution levels of wood or coal burning.

In private correspondence with a wood heater manufacturer he has admitted to me his frustration on not being able to control what his customers burn and freely admits that their customers will throw in plastic milk bottles and the like. He told me he is frustrated that benefits from trying to educate wood burner users seem to not achieve very much and that the gap between real world and laboratory testing is a problem he has no answer for. He told me he views his customers as "a bit thick".

It also doesn't help when [REDACTED] advertising is made by the industry that fraudulently promote woodburners as "clean", "eco", "green" or "carbon neutral", all of which woodburners aren't.

Customers [REDACTED] none seem aware that they are most likely polluting at levels way beyond which their laboratory tested emission results claim. I think all advertising claims made by the wood burning industry should be subject to scientific scrutiny and the Trades Practices Act. I believe the AHHA and the wood heater manufacturers are systematically [REDACTED] in their advertising.

In summary:

	Present	Recommended future standard
AS/NZS4012 - Power output and efficiency	Whatever it is	Standard is obsolete when other measures are taken into account as all wood burners would be prohibited.
AS/NZ4013 - flue gas emissions	4.0g of PM ₁₀ per kg of dry fuel under laboratory conditions	Real world emissions are considered, not laboratory conditions. PM _{2.5} are included. Levels for PM _{2.5} and PM ₁₀ set so they will never exceed ambient air quality standards under a fair use scenario. i.e. no one can pollute more than their fair share. Fair use real world levels likely have to be < 0.1g/kg
Ambient air quality standards	50 µg/m ³ of PM10. No more than 1 exceedence a year. Averaged over 24 hours.	15 µg/m ³ of PM10 and PM2.5 totals (if safe, and lower still if they are above safe levels). Averaged over 1 hour (as averaging over 24 hours can hide peaks). Zero exceedences.

The only practical way that even present ambient air quality standards can be met is with prohibition of current woodburners. The proposed 2.5g PM10 per kg dry fuel are also going to mean that ambient air quality standards aren't met. Thousands of people in Australia and New Zealand will still die prematurely each year at great cost to the community.

My own experience with being a wood smoke victim is that some people are affected more than other people. Monitoring might be done at only one place in an airshed, but that is little comfort if the pollution source is right next to your house, or directly upwind. An important principle, that was denied to me, is that people should have the right not to breathe woodsmoke. Whatever other regulations are considered, the right of veto over a wood heater that is causing nuisance should be upheld. If when I complained about the woodheaters that smoke me out of my house, they could have been shut down at my request then the problem would have been solved without fuss. Instead I had to deal with neighbours who were incredibly belligerent from the outset, a completely deaf local council [REDACTED] who had an unsympathetic and scientifically illiterate

environment officer, and because my complaint was palmed off to the Australian Home Heating Association and their offer of help, with the AHHA. From the outset I found the true purpose of the AHHA helping in domestic pollution disputes is to shut the complainant up. They were completely not interested in the fact my house was unliveable. They gave useless advice to my belligerent neighbours telling them to burn in a "clean" manner. There is no clean way to burn wood. All woodburners are polluting, and it doesn't matter how clean they test in laboratory testing. [REDACTED]

[REDACTED]

After the failure of my local council to do anything constructive, and the complete non-help from the AHHA, I tried getting an injunction against my neighbours burning, and it was frustrating, because of the expense, and the judge asked me to get scientific proof of the pollution as if my testimony that I had to barricade myself into the least affected room, and my smoke detectors would go off inside my house even with all the windows and roller shutters shut, was not enough. The hearing was adjourned for me to get scientific evidence, but before the case was reheard I sold my house and moved away, at considerable personal expense. The only reason I moved was the wood smoke pollution.

So currently there are no protections from wood smoke. It chooses its victims selectively. It can be an incredibly traumatic experience to lose one's house to it. [REDACTED]

[REDACTED]

To summarise:

The AHHA [REDACTED] motives are likely to be cynical and profit driven.

The AHHA should not set the standards. It should have no right of veto over the standards. The standards definitely should be tightened, and not just AS/NZS4012 and 4013, but ambient air quality standards too. The levels set should be set by the scientific evidence of the epidemiology and chemistry of woodsmoke, plus be based on real world emissions of wood heaters where people using them can and do burn any old rubbish they like.

Everyone should have the right to live smoke free enshrined in law. Disputes caused by wood smoke should be straightforward, non-stressful and should be ruled by default in favour of the person complaining. Any onus of proof of it not being harmful should fall on the polluting party.

No place in Australia (or New Zealand) should have ambient air quality worse than the tightened standard allows. This should happen as soon as possible, not endlessly delayed.

Woodheaters should be prohibited in all suburbs, towns and closely settled rural districts.

Appendix A - Chemical components of woodsmoke

Table 1: Summary of the Toxic Chemical Agents Identified in Woodsmoke.

Chemical class	Number of compounds	Mode of toxicity	Representative compounds *
Toxic gases	4+	Irritant, acute toxicity	Carbon monoxide Ammonia Nitrogen dioxide Sulfur dioxide
VOCs (C2-C7)	30+	Irritant, possibly carcinogenic	Methyl chloride Methylene chloride
Saturated hydrocarbons	25+	Irritant, neurotoxicity	Hexane
Unsaturated hydrocarbons	40+	Irritant, carcinogenic, mutagenic	1,3-butadiene Acrolein
Mono-aromatics	28+	Irritant, carcinogenic, mutagenic	Benzene Styrene
Polycyclic aromatic hydrocarbons (PAHs)	20+	Carcinogenic, mutagenic, Immunotoxic	Benzo[163]pyrene, Dibenz[a,h]anthracene
Organic alcohols and acids	25+	Irritant, acute toxicity, Teratogenic	Methanol Acetic acid
Aldehydes	20+	Irritant, carcinogenic, mutagenic	Formaldehyde, Acetaldehyde
Phenols	33+	Irritant, carcinogenic, mutagenic, teratogenic	Catechol Cresol (methyl-phenols)
Quinones	3	Irritant, allergenic, Redox active, causes oxidative stress and inflammation response, possibly carcinogenic	Hydroquinone Fluorenone Anthraquinone
Free radicals		Redox active, cause oxidative stress and inflammation response, possibly carcinogenic	Semi-quinone type radicals
Inorganic compounds	14+	Carcinogenic, acute toxicity	Arsenic Lead Chromium
Fine particulate matter		Inflammation, may be allergenic	PM _{2.5}
Chlorinated dioxins		Irritant, may be carcinogenic or teratogenic	
Particulate acidity		Irritant	Sulfuric acid

* Compounds in italics are either criteria air pollutants, or are included on the EPA list of hazardous air pollutants. At least 26 hazardous air pollutants are known to be present in woodsmoke