What do you think are the best value actions listed in the statement that are likely to help improve future air quality?

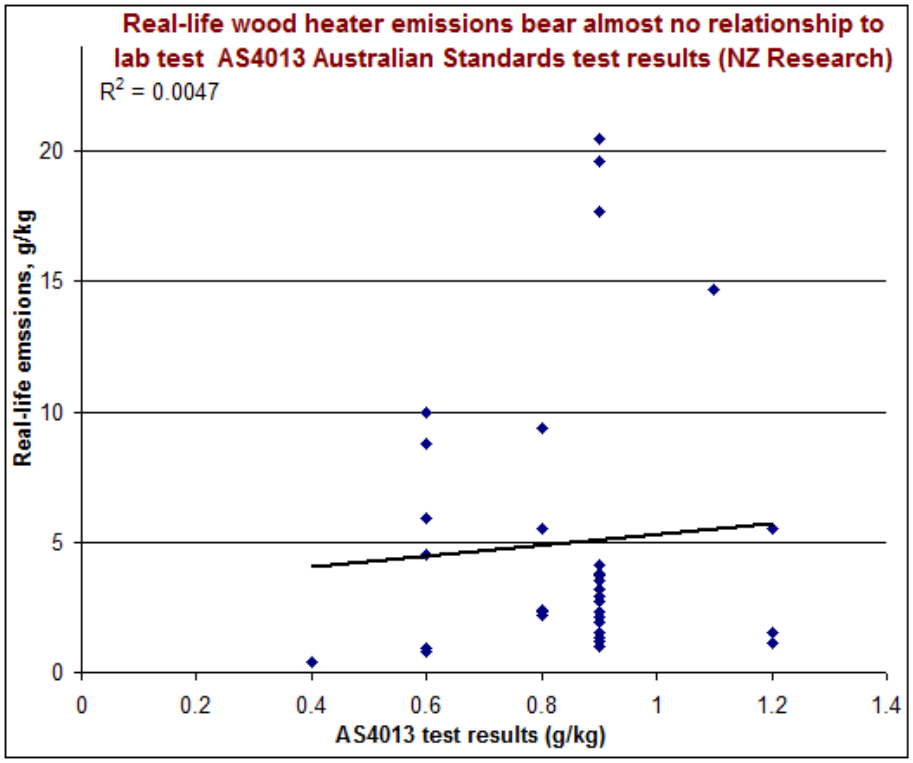
The best value actions are those with the greatest net benefit. The policy impact assessment of Victoria's draft Waste Management Policy (Solid Fuel Heating, DWMP-SFH, released November 2017) concluded that the **health costs of residential wood heating amount to $8 billion**.

In a New Scientist article 'We really must stop burning wood' (June 2018), air pollution expert Gary Fuller, King's College London, says: "*Having a neighbour with a wood burner is like having 8 trucks sitting in your street with the engines idling all night....Oh, if you think that burning wood is at least better for the climate, you are wrong. In most cases, sticking with gas central heating and properly insulating your home is less harmful in global warming terms than switching to a wood burner.*"

Although strengthening Victorian standards such as wood heater emissions, represents the best value action listed in the Vic Air Quality Statement, a major reduction of at least 90% in ***real-life*** emissions is needed.

The graph below, compiled from the data in Appendix 1 of the AAQG submission to the DWMP-SHF, shows that the current AS4013 lab test for wood heaters bears virtually no relationship to real-life emissions.

Reducing emissions in a lab test that bears virtually no relationship to real-life emissions provides little or no benefit. In fact, it could create significant harm by generating a false sense of security that produces years of misery and ill health, especially for people who are unfortunate enough to live near to such installations. A moratorium is therefore needed on new installations until a test has been developed that accurately predicts real-life emissions. In addition, all installations based on the current test should be removed, especially when they affect the health of people living nearby.



How would you build on or vary these actions?

The Federal Government released a Consultation Regulation Impact Statement for Reducing Emissions from Wood Heaters' (CRIS) in April 2013. A majority (33) of the 59 submissions on the CRIS either advocated banning or phasing out all wood heaters in urban areas (25 submissions) or not allowing new wood heaters to be installed (8 submissions). Nearly half of all submitters reported suffering from unresolved problems caused by neighbouring wood heater pollution, with 39% of all submissions reporting adverse health effects often requiring increasing medicinal solutions, including steroid use for asthma diagnoses in children. Similar neighbourhood examples were also cited in submissions from other stakeholders, such as academic and community groups.

Until a new test is developed, the estimated health cost in Melbourne of a brand new wood heater with lab test emissions of 1.5 g/kg is over $6,500 per year – see Table 1 (right hand column) of woodsmoke.3sc.net/submiss

As noted above, a moratorium on new installations is needed until a test has been developed that accurately predicts real-life emissions. In addition, all installations permitted because of the current unrepresentative test need to be removed, especially when they affect the health of people living nearby.

Air pollution expert Gary Fuller said: "*Having a neighbour with a wood burner is like having 8 trucks sitting in your street with the engines idling all night.*" The deterioration in air quality from having even one truck idling all night should be considered unacceptable, let alone eight.

New installations should not therefore be allowed until a standard has been developed that reduces real-life emissions by at least 90% and a large proportion of the funds available for reducing air pollution used to phase out existing wood heaters, given their the massive $8 billion health cost.

Are you able to provide any data or information that will help government assess the feasibility and cost-effectiveness of air quality management actions?

The policy impact assessment of Victoria's draft Waste Management Policy (Solid Fuel Heating) showed that the health costs of residential wood heating amount to $8 billion. Modern, efficient heat pumps have superseded wood stoves and natural gas as the most cost-effective heating. They can deliver 5 or 6 times as much heat to the home as they use in electric power and are effective at low temperatures, providing 3 to 4.5 times as much heat even when the temperature outside is ‑10 °C (10 degrees below freezing). They are affordable (cheaper than buying a wood heater), cause less global warming (zero in households that use green power) and have lower running costs than buying firewood.

This implies that switching to non-polluting heating will save money, i.e. have a zero net cost and substantial environmental benefits.

The latest research raises extremely serious concerns about the health damage from woodsmoke pollution, including serious effects on children. For example, The "Growing up in New Zealand" study found that every *additional modern woodstove per hectare increased by 7% the risk children under 3 would need hospital emergency treatment*.

Woodsmoke pollution also damages the lungs, hearts and brains of adults. "We have seen that people who live in areas where wood-fire stoves are common run a greater risk of being affected (by dementia), and that also goes for people who live next to someone who uses wood-fire stoves," said Anna Oudin, a researcher in occupational and environmental medicine at Umea University's department of public health and clinical medicine. The risk for residents living in areas with the highest rate of smoke from wood fires to be hit by dementia, or dementia-related diseases, was 30% higher compared to other residents in the town of Umea. "In households that had their own wood-fire stoves the risk was 70% higher."

The abstract of the journal paper shows that woodsmoke exposure of just 1 ug/m^3 of PM2.5 increased the risk of dementia by 55%. In May/June 2018, woodsmoke pollution at the new OEH monitoring station in Armidale, NSW averaged 17 ug/m^3, 17 times worse than the exposure to woodsmoke that was found to increase dementia by 55%. In the USA, increased exposure of 10 ug/m^3 PM2.5 increased the risk of dementia by 80%, Alzheimer's by 150% and the risk of Parkinson's diseases by 80% Increased exposure of 3.5 ug/m^3 reduced the volume of white matter in the brain by 6.2 cubic centimeters. Exposure to PM2.5 pollution above the US EPA standard of 12 ug/m^3 nearly *doubles the risk of cognitive decline and all-cause dementia*; exposure to this level of PM2.5 pollution quadrupled the risk for people with 2 copies of the APOE gene.

Researchers from the Menzies Institute for Medical Research showed that that hospital admissions for heart failure (HF, the leading cause of hospitalisation for adults aged over 65 years) started to increase as soon as PM2.5 from woodsmoke exceeded 4 ug/m^3. They are now investigating the role of HEPA filters in reducing the risk.

What more data or information is needed to make this the top priority? What other clean air policy option will save $8 billion in health costs for a zero net cost?

Please also consider all submissions on Victoria Waste Management Policy (Solid Fuel Heating) variation (which closed 16 May 2018) as submissions on the current consultation – they are just as relevant now as when submitted.

Waste Management Policy (Solid Fuel Heating) variation
Submission: Australian Air Quality Group

Proposal saves only 0.4% of $8 billion health costs - not fit for purpose

Reducing wood heater pollution is one of 3 key initial actions of the National Clean Air Agreement. **Given the $8 billion estimated health cost of wood heater pollution, a 0.4% reduction is hardly fit for purpose**.

Assessment uses grossly incorrect assumptions

The VW scandal shows that highly controlled tests in the laboratory don't represent what happens in real-life. This is a major issue for wood heater pollution. Real-life emissions of 37 heaters installed in ordinary homes were measured in six New Zealand cities. In the lab test, emissions averaged 0.85 grams of particles per kilogram of firewood burned, well within the requirements that will apply in Australia from 2019. Since 2005 (and even earlier in Christchurch), NZ has required stricter lab test results for heaters installed in urban areas than those that will apply in Australia in 2019. But real-life emissions of the 37 NZ heaters averaged 6.6 grams/kg firewood, nearly 8 times worse than the lab tests (see Appendix for details).

Despite the NZ results, the Victorian Policy Impact Assessment (PIA) assumes new heaters will have real-life emissions of 2.6 g/kg, nothing like the real-life measurements in NZ!! The totally unrealistic value in the PIA seems to be a guesstimate extrapolated from CSIRO's 2008 work on much older heaters that satisfied a lab test introduced in 1993. Why were grossly inaccurate guesstimates used when much better information was available? **Like the proposed policy, the policy impact assessment is not fit for purpose and should be redone**.

Were the consultants unaware of the research into real-life emissions in New Zealand? Was any pressure exerted by vested interests to further profits by making new heaters seem much cleaner than they are? How will this failure be addressed and what steps will be taken to prevent such grossly unacceptable and dangerously incorrect policy assessments in future?

Good policies maximize total benefits, not benefit-cost ratios

The estimated net benefit of alternative policy 2 (increase existing wood heater replacement rate) was $463 million, 14 times better than the proposed policy.

Many of Infrastructure Victoria's proposals have estimated benefit-cost ratios of 1.0-1.4[1]. A policy with a benefit-cost ratio of 8.8 and net benefits of $463 is far superior to one with a net benefit of just $33 million, even if some additional legislation is required for its adoption.

This assessment fails the 'pub test'. The health costs of air pollution are dominated the cost of premature deaths [1]. If asked to choose between a policy that saved 261 lives for a cost of $59 million or one that saved 16 lives for a cost of $213,000, who would not want to save more lives?

Biased summary of previous consultations, leaves unanswered questions

The PIA mentions the '*Consultation Regulation Impact Statement for Reducing Emissions from Wood Heaters*' (CRIS) in April 2013. A majority (33) of the 59 submissions on the CRIS either advocated banning or phasing out all wood heaters in urban areas (25 submissions) or not allowing new wood heaters to be installed (8 submissions). Nearly half of all submitters reported suffering from unresolved problems caused by neighbouring wood heater pollution, with 39% of all submissions reporting adverse health effects often requiring increasing medicinal solutions, including steroid use for asthma diagnoses in children. Similar neighbourhood examples were also cited in submissions from other stakeholders, such as academic and community groups.

None of these problems was considered in the Vic EPA policy impact assessment. Instead of recognising the hardship and suffering caused by caused by breathing other people's woodsmoke, the PIA simply suggests that local councils (that were obviously unable to solve these problems) should continue with more of the same failed policies.

Only 10 submissions on the CRIS supported of the wood heating industry, but these 10 submissions are given more prominence in the PIA than the 39 submissions supporting effective regulations to clean up the air, something the proposed policy fails to do. The bias is substantial, including 1) negligent guesstimates of real-life emissions from new heaters that are nothing like the real-life data from NZ, 2) an evaluation process that considers saving 261 lives for $59 million inferior to saving 16 lives for a cost of $0.21 million, and 3) a complete failure to provide any practical solutions for neighbours suffering serious health effects from nearby wood heaters. The outcome couldn't have been any better for the wood heating industry if they had written the policy themselves!

The Vic EPA's web page advertising the Waste Manage Policy (Solid Fuel Heating) consultation states: "*EPA would like to hear from all interested stakeholders, particularly those in the solid-fuel heater industry, to consider how they may be affected by the proposed variation.*" Why focus on the wood heating industry, but not health advocates? Which is more important – a sick child needing hospital treatment or the profits of the wood heating industry?

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[1] blogs.crikey.com.au/theurbanist/2016/10/11/is-infrastructure-victorias-30-year-strategy-any-good/

"Growing up in New Zealand" study: 1 woodstove per hectare = significant health damage

The "Growing up in New Zealand" study found that every additional modern woodstove per hectare increased by 7% the risk children under 3 would need hospital emergency treatment (for all causes except accidents). The emissions and efficiency requirements introduced in New Zealand in 2005 for all urban areas are stricter than those to apply in Australia in 2019. The failure of the 2005 NZ standard to produce meaningful reductions in pollution (despite being stricter than the proposal for Victoria in 2019) has been recognized in NZ, e.g. by the introduction of a completely different test for all new heaters to be installed in Christchurch. Unless the policy proposed for Victoria is changed, many children will need hospital treatment because of a failure to protect them from unacceptable levels of woodsmoke pollution.

Alternative policy could save up to $6 billion

A consultancy report for the NSW government in 2012 concluded that wood smoke pollution was an $8 billion health problem in NSW, but that not allowing new heaters and removing existing heaters, e.g. when houses are sold, would reduce estimated health costs by 75% [2]. This equates to an estimated net saving of $6 billion in Victoria for a cost of perhaps $170 million, i.e. 35 times as many benefits as costs. Why was this option not taken seriously?

Should have investigated other alternatives, e.g. Christchurch's policy, Vic gas heater policy

The PIA mentions other policies such as that in Christchurch, NZ, before the AS4013 test was abandoned (because of its inability to predict real-life emissions). To avoid the potential problem highlighted in the PIA that not allowing new heaters might encourage existing wood heater users to hold on to older models, Christchurch allowed new heaters to be installed, but only as replacements for more polluting models. Christchurch's current policy of requiring all new heaters to satisfy an improved wood heater test designed to represent real-life emissions should also have been investigated.

The Mutual Recognition act did not prevent changes to protect the health of Victorians from unflued gas heater pollution. Unflued gas heaters 1) can be installed only as replacements for older unflued gas heaters and 2) must satisfy Energy Safe Victoria requirements. A similar policy for wood heaters could prevent many premature deaths and saved billions in health costs. Why wasn't it considered?

Current proposals don't protect sensitive groups (pregnant women, children, elderly, asthmatics) from the unhealthy pollution of nearby wood heaters

According to the PIA, past consultations "support EPA's belief that there is still a high degree of community concern about air quality, including concern about the use of wood heaters." Also noted is the fact that the EPA receives complaints about inaction by local councils in addressing problems caused by other people's woodsmoke. There is general agreement that there is no safe level of PM2.5 pollution and that significant health damage can result from the increased PM2.5 exposure from living next to a modern wood heater (as was observed in the Growing up in NZ study). The policy should therefore include provide safeguards to ensure that wood heaters do not damage the health of nearby residents.

Natural gas not the answer

Modern, efficient heat pumps (also called reverse cycle air conditioners) have superseded wood stoves and natural gas as the most cost-effective heating. They can deliver 5 or 6 times as much heat to the home as they use in electric power, are affordable (as cheap as buying a wood stove) and have lower running costs than buying firewood. In addition they cause a lot less global warming, and don't damage our health.

A report in 2015 by Tim Forcey: "*Switching off gas - An examination of declining gas demand in Eastern Australia*" explains: "*Economic fuel-switching results in significant energy-cost savings for former domestic gas consumers. Based on analysis by MEI and the Alternative Technology Association, people living in up to one million homes across eastern Australia (and most particularly in Victoria) can start saving hundreds of dollars on their heating bill tomorrow if they switch off their gas heater and turn on their reverse-cycle air conditioner.*

"Space-heating cost savings of $1,733/year (a savings of 77%) were modeled for a large home in Canberra and $658/year (63%) for a large home in Melbourne. Unfortunately, householders are unaware of these remarkably-large and quick savings because of out-of-date and inaccurate information. It is possible that in Victoria alone, households could collectively and immediately save on the order of $250 million/year by using as a space-heater the reverse-cycle air conditioners they already have in their homes."

This PIA continues the promulgation of out-of-date and inaccurate information. Instead of wasting taxpayers' money on the Regional Gas Infrastructure Program, the government should explain the cost and climate benefits of modern, efficient, heat pumps compared to wood and gas heating. Surplus funds should be used to improve public health by subsidising the replacement of wood stoves with heat pumps.

Current proposals inconsistent with precautionary principle

The mistakes made with asbestos should not be repeated with woodsmoke. As the most significant source of PM2.5 (the most health-hazardous air pollutant) in urban areas, woodsmoke has been labelled the new asbestos. The average brand new heater emits more PM2.5 per year than 1,000 petrol cars. Indeed, the NSW Asthma Foundation warned that: wood

smoke emissions in winter pose a bigger immediate health danger in built-up urban areas than cars or cigarettes. Australian Lung Foundation spokesman Dr James Markos said that real-life emissions from new wood-heaters have little relationship to measurements from a perfectly operated test model under laboratory conditions. .

The chief medical officer of NSW said that wood heaters are so detrimental to health she supports banning and phasing them out in built-up urban areas. A review by the New Scientist in 2017 concluded that log-burning stoves are harming our health and speeding up global warming

Woodsmoke contains the same and very similar chemicals to cigarette smoke. A review by Naeher noted: ***"Organic extracts of ambient particulate matter (PM) containing substantial quantities of woodsmoke are 30- fold more potent than extracts of cigarette smoke condensate in a mouse skin tumor induction assay"*** . Studies in Canada found that just 5 ug/m3 of increased PM2.5 pollution increased heart attacks by 19% when the pollution was mainly from wood burning.[3]

Heart attacks and strokes are the tip of the iceberg. The PM2.5 and toxic chemicals in woodsmoke increase the risk of lung diseases, cancers, Alzheimer's, cot deaths, still and premature births, genetic damage in babies, stunted lung development, reduced IQ in children and behavioural problems such as anxiety, attention deficit and autism.[4]

Tackling woodsmoke pollution has saved many lives. When Launceston residents understood the health effects of woodsmoke, the proportion of households using wood heating fell dramatically from 66% to 30% and average PM2.5 pollution during winter fell by 40%. **The result was 28% fewer deaths in winter from respiratory disease and 20% fewer deaths from cardiovascular disease.**

Given the serious health damage from the proposed policy and the precautionary principle, the government has a Duty of Care to protect public health. This Duty is inconsistent with allowing new wood heaters to be installed unless their safety can be guaranteed. The $8 billion health damage from allowing a small proportion of households in Victoria to use wood heaters represents an intolerable health cost. Consequently, existing wood heaters should also be phased out as soon as practicable. If new legislation is required to achieve this, or ensure that future heating options do not damage public health, work should commence immediately on developing the legislation needed to achieve this important and necessary aim. It would have been inappropriate and unconscionable to allow asbestos to continue to be installed in Victoria once the dangers were known, just because the product was legal in other states. The same argument applies to wood stoves. The Duty of care is to protect public health and safety, not the profits of the wood heating industry.

Appendix 1 Summary of AS4013 vs Real-Life Test Results in NZ

			AS4013' g/kg	Real Life g/kg	Ratio
2009	Christchurch	(Bluett & Meyer 2011b)	0.6	6.9	11.6
2009	Christchurch	(Bluett & Meyer 2011b)	0.8	6.6	8.3
2009	Christchurch	(Bluett & Meyer 2011b)	0.6	10.5	17.5
2009	Christchurch	(Bluett & Meyer 2011b)	0.9	23.0	25.5
2009	Christchurch	(Bluett & Meyer 2011b)	1.2	1.9	1.6
2009	Christchurch	(Bluett & Meyer 2011b)		5.8	
2007	Nelson	Smith et al., (2009)	0.6	1.0	1.6
2007	Nelson	Smith et al., (2009)	1.2	1.3	1.1
2007	Nelson	Smith et al., (2009)	0.4	0.5	1.2
2007	Nelson	Smith et al., (2009)	0.6	1.1	1.8
2007	Nelson	Smith et al., (2009)	0.9	1.2	1.3
2007	Nelson	Smith et al., (2009)	0.6	5.7	9.5
2007	Rotorua	Smith et al., (2009)	0.9	1.8	2.0
2007	Rotorua	Smith et al., (2009)	0.9	1.4	1.6
2007	Rotorua	Smith et al., (2009)	0.8	2.8	3.5
2007	Rotorua	Smith et al., (2009	0.9	3.1	3.5
2007	Rotorua	Smith et al., (2009	0.9	3.6	4.0
2007	Rotorua	Smith et al., (2009	0.9	2.9	3.2
2007	Taumarunui	Smith et al., (2009	0.9	2.7	2.9
2007	Taumarunui	Smith et al., (2009	0.8	3.1	3.8
2007	Taumarunui	Smith et al., (2009	0.8	13.8	17.3
2007	Taumarunui	Smith et al., (2009	0.9	28.9	32.1
2007	Taumarunui	Smith et al., (2009	0.8	3.1	3.9
2007	Taumarunui	Smith et al., (2009	0.9	5.7	6.3
2006	Tokoroa	(Kelly et al., 2007b)	0.9	4.3	4.7
2006	Tokoroa	(Kelly et al., 2007b)	0.9	4.6	5.1

2006	Tokoroa	(Kelly et al., 2007b)		11.2	
2006	Tokoroa	(Kelly et al., 2007b)	0.9	4.3	4.7
2006	Tokoroa	(Kelly et al., 2007b)	0.9	4.9	5.5
2006	Tokoroa	(Kelly et al., 2007b)	0.9	3.0	3.3
2006	Tokoroa	(Kelly et al., 2007b)	0.9	3.8	4.2
2006	Tokoroa	(Kelly et al., 2007b)	0.9	2.4	2.7
2006	Tokoroa	(Kelly et al., 2007b)	0.9	3.6	4.0
2003/04	Christchurch or Nelson		0.6	11.9	19.8
2003/04	Christchurch or Nelson		1.1	18.1	16.5
2003/04	Christchurch or Nelson		1.2	7.0	5.8
2003/04	Christchurch or Nelson		0.9	26.1	29.0
Grand Mean			0.85	6.6	7.7

Appendix 2. Additional information on health and pollution from new wood heaters

Health experts advise: current wood heater models are too polluting to be allowed. NSW Chief Medical Officer Kerry Chant said wood heaters are so detrimental to health she supports banning and phasing them out in built-up urban areas. The NSW Asthma Foundation warned that: wood smoke emissions in winter pose a bigger health danger in built up urban areas than cars or cigarettes. Australian Lung Foundation spokesman Dr James Markos said wood fire heaters should be banned from urban areas. He said real-life emissions from new wood-heaters have little relationship to measurements from a perfectly operated test model under laboratory conditions. The UN Environment Program/World Meteorological Organization (UNEP/WMO) recommended phasing out log-burning heaters in developed countries to reduce global warming as well as improve health. People who understand the issues generally support these measures –56% of submissions to the Commonwealth Government's Wood-heater Consultation Regulation Impact Statement supported either a ban on all wood heaters, or not allowing new ones to be installed.

Launceston's $2.08 million woodsmoke program reduced deaths in winter from respiratory disease by 28% and cardiovascular disease by 20%. Year round, for men, the reductions were 23% (respiratory), 18% (cardiovascular) and 11.4% (all deaths).

No safe level of PM2.5 pollution – 25 ug/m^3 equates to smoking 3 cigarettes/day. Health authorities warn there is no safe level of PM2.5 pollution. Medical doctor & epidemiologist at the University of Newcastle, Dr Ben Ewald, told the Senate Inquiry into air pollution and health that exposure at the current advisory limit of 25 ug/m^3 has equivalent mortality risks to actively smoking 3 cigarettes a day. The recent consultation on particle standards showed overwhelming support for a reduction to 20 ug/m^3 PM2.5. Woodsmoke was described as worse than car exhausts.

PM2.5 linked to heart attacks, strokes, cancers, lung diseases & affects babies and children at levels well below 25 ug/m^3. Woodsmoke-affected towns such as Armidale still have many days above the current limit of 25 ug/m^3, let alone 20 ug/m^3. Few people in Armidale realise that the entire city often suffers air pollution levels worse than everyone smoking 3 cigarettes a day, or than in Canada, woodsmoke levels of just 6 to 10 ug/m^3 were found to increase the risk of chronic obstructive pulmonary and adversely affect markers of blood vessel health that are associated with increased risk of heart disease. There is limited awareness that, as well as increased risk of heart attacks, strokes, cancers and lung diseases, toxic chemicals in woodsmoke known as PAH have been linked to genetic damage in babies and reduced IQ when children start school. Similar problems have been noted in developing countries, where children whose mothers cook with wood (as opposed to kerosene) have reduced IQ, memory and poorer social skills. An Australian study linked **using a closed wood heater to childhood brain tumours**; another found that **wood stove use increased the risk of acute lymphoblastic leukaemia in childhood.**

Increased exposure of just 2 ug/m^3 PM2.5 increases the risk of silent stroke in those over 60 by 46% and decreases brain volume by 0.32%. A study published in the American Heart Association journal, Stroke, found a 2 µg/m^3 increase in PM2.5 exposure was associated with a 0.32 percent smaller total cerebral brain volume and a 46% higher risk of covert brain infarcts, a type of silent stroke. One in six people in Australia will be affected by stroke. It is the nation's

leading cause of disability. Living downwind of an Australian wood heater (new or old) will often increase annual PM2.5 exposure by more than 2 ug/m^3.

A peer-reviewed study of spatial variability of PM2.5 pollution in Armidale concluded that wood heaters increased annual PM2.5 population exposure by about 11.5 ug/m^3, implying that residents will suffer 2.6 times as many covert brain infarcts as they would if the city had no woodsmoke pollution. PM2.5 concentrations were highest in residential areas (rather than in the CBD, where the PM2.5 is measured by the local council).

1 day's heating = 120,000 cigarettes. Wood smoke was found to cause 12 to 30 times as many tumours in mice and mutations in bacteria as the same amount of cigarette smoke. A single wood heater chimney burning 20 kg wood (a day's heat) emits about 200 grams of PM2.5, as much as in the smoke from 10,000 cigarettes, with the tumour potency of at least 120,000 cigarettes.

2 hours wood-heating = 1 year of driving. Woodsmoke PM2.5 was described as worse than car exhausts. The average new wood-heater emits I car emits about 20 grams of PM2.5 in 2 hours, as much as the average petrol car emits in an entire year.

Links to autism. Prof Frank Kelly, director of the environmental research group at King's College London, discussed the research linking PM2.5 pollution to autism: "I think if it was this study by itself I wouldn't take much notice, but it's now the fifth that has come to the same conclusion".

No health-based wood heater standard.. Standards Australia's protocols allow industry to veto proposed changes. A new emissions test was under development in 2007 until the wood heating industry vetoed recommendations approved by 15 votes to 4 by the previous Standards Australia committee to set an interim limit of 2 g/kg and require wood heaters to display warnings to alert users to the dangers of breathing woodsmoke. Work on the new test was abandoned after the veto in 2007. A new committee with no health nor epidemiological experts was formed in 2013 at the request of the wood heating industry. Unsurprisingly (given the industry veto), the revision required only minimal changes - the emissions limit will be reduced to 2.5 g/kg from August 2015.

The photos on the previous page show emissions from brand new heaters in brand new houses in Armidale. The newest installation (August 2014) was noted to have emitted smoke continuously at the level shown for over 10 hours, despite Armidale Council's education policy and requirement for new heaters to be rated less than 2.5 g/kg. All except the top left chimney have ratings known to be less than 2.5 g/kg. Reducing the limit on a test that does not measure real-life emissions does not appear to be effective. In New Zealand, several small towns, e.g. Alexandra (pop 4824), Arrowtown (pop 2400), Clyde (pop 900), Cromwell (pop 4896) have virtually no other sources of air pollution apart from wood-heaters. These towns reduced the limit for new heaters to 0.7 g/kg and required those with AS4013 ratings over 1.5 g/kg to be removed by January 2012. Despite this, the four towns had respectively 42, 24, 7 and 29 exceedances of the 50 mg/m^3 limit in 2012.

Education programs ineffective. Launceston's $2.05 million education and wood-heater replacement program did not solve their problem of emissions from new heaters. Real-life emissions from AS4103 heaters operated by motivated volunteers (observed in several cases to refuel the heater in the middle of the night, rather than leave it to smoulder) averaged 9.4 g/kg. This suggests that the best that can be expected from a new heater burning 3 tonnes of wood per year is about 30 kg PM2.5, similar to annual PM2.5 emissions from *2,000 petrol cars* each driving 15,000 km per year in the city.

Armidale Dumaresq Council's submission to the Federal Government in 2013 on wood-heater regulation states: "It is estimated that Council has committed more than $300,000 (excluding wages) in the past 10 years on wood smoke abatement measures". Despite this, over the last 3 years (2012-14) PM2.5 from May to August averaged 14.9 ug/m^3 at the CBD, compared to 13.9 ug/m^3 for June to August in 1999.

Industry-set "standards" are meaningless. Allowing the wood heating industry to set standards makes no more sense than allowing the tobacco companies to set policy on cigarettes. New standards for vehicles (set by the Commonwealth Government) reduced PM2.5 emissions from diesel cars and SUV by more than 99%. Councils should therefore insist on a new wood heater standard, set by independent health experts, before any more heaters are installed. History shows that when new standards are set, industry soon develops less polluting models.

UN Environment Program recommends phasing out log-burning heaters to reduce global warming. This option is best for health and, as the UN Environment Program/World Meteorological Organisation advises, also helps limit global warming to 2 degrees. On low burn, enclosed wood heaters emit substantial quantities of methane, carbon monoxide, black carbon and ozone precursors. Over the critical period between now and when the 2 degree target is likely to be exceeded, the average house using wood heating is likely to cause about 10 times as much global warming as one using an efficient electric heat pump.

New houses have clean, cost-effective alternatives. Thanks to State Government regulations, new houses must have insulation and, thanks to Federal Government Minimum Energy Performance Standards (MEPS), the average new heat pump is about twice as efficient as 10 years ago. Data provided by one manufacturer shows that even when the outdoor temperature is minus five degrees and the desired indoor temperature is 20 degrees, one of their units can deliver more than 4 kW of heat to the house while using only 1 kW of electricity. At milder outdoor temperatures (e.g. 6 degrees), even less electricity is needed - the Coefficient of Performance increases to 4.6.

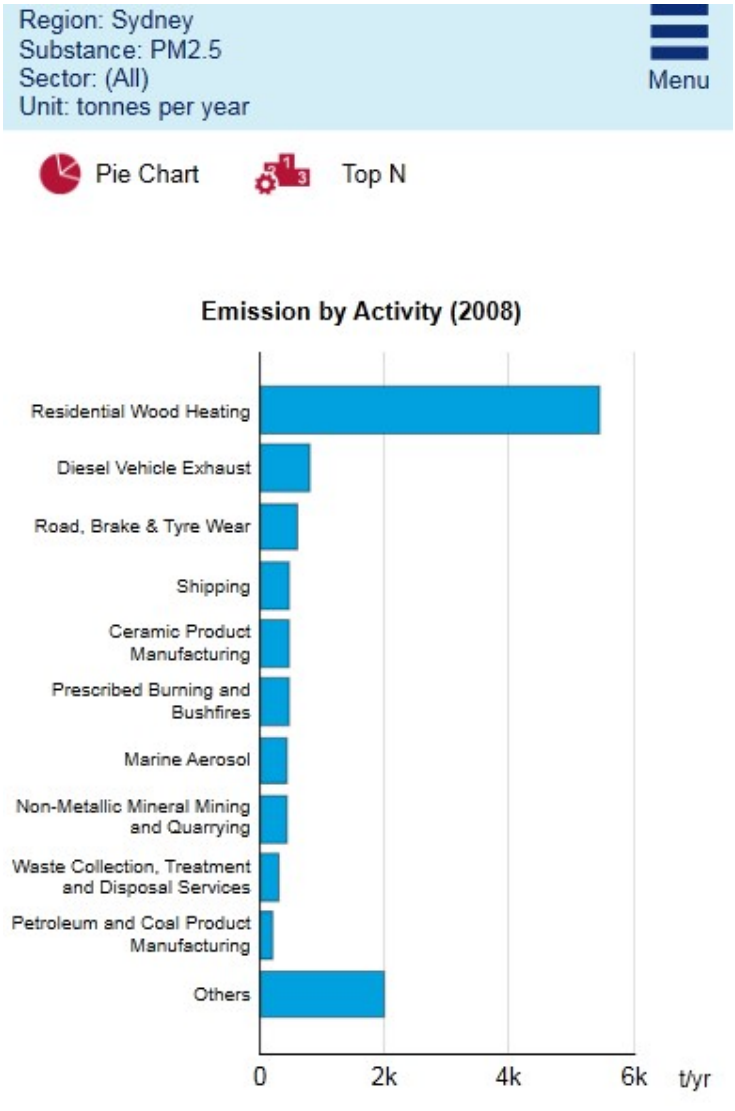
Suggested Changes to Proposed Policy

1) New log-burning heaters should not be installed in urban areas until a health-based standard has been developed by independent experts. As noted above, NSW Chief Medical Officer Kerry Chant said wood heaters are so detrimental to health she supports banning and phasing them out in built-up urban areas. The NSW Asthma Foundation warned that: wood smoke emissions in winter pose a bigger health danger in built up urban areas than cars or cigarettes. Australian Lung Foundation spokesman Dr James Markos said wood fire heaters should be banned from urban areas..

2) Emissions from existing wood heaters should be addressed. Smoke plumes from wood heaters satisfying the currant standard of < 2.5 g/kg have been observed impacting house blocks over 200 metres away. The community should be advised that even a single brand-new wood heater meeting the "standard" to apply from August 2015 is likely to increase PM2.5 exposure of the downwind neighbour by 2 ug/m^3 and so result in significant reductions in brain volumes and a 46% increase in the risk of covert stroke. Is this considered an acceptable risk? One in six people in Australia will be affected by stroke. It is the nation's leading cause of disability.

3) The above recommendation has general public support, e.g. 56% of submissions for the Federal Government's Wood-heater Consultation Regulation Impact Statement (CRIS) supported either a ban on all wood heaters, or not allowing new ones to be installed.

4) The EPA should improve public awareness of the amount of pollution from wood heaters. People need to know the facts in order to make informed decisions. Being told that woodsmoke is "harmful" or that wood heaters are "polluting" could simply mean that wood heaters pollute as much as cars, or that woodsmoke is no more harmful than passive smoking. The evidence shown above implies that, even when people try to operate the average wood heater correctly, it still emits more PM2.5 (the most hazardous air pollutant) per year than 2,000 cars and that 25 ug/m^3 of PM2.5 pollution in a city's air is equivalent to smoking 3 cigarettes a day.



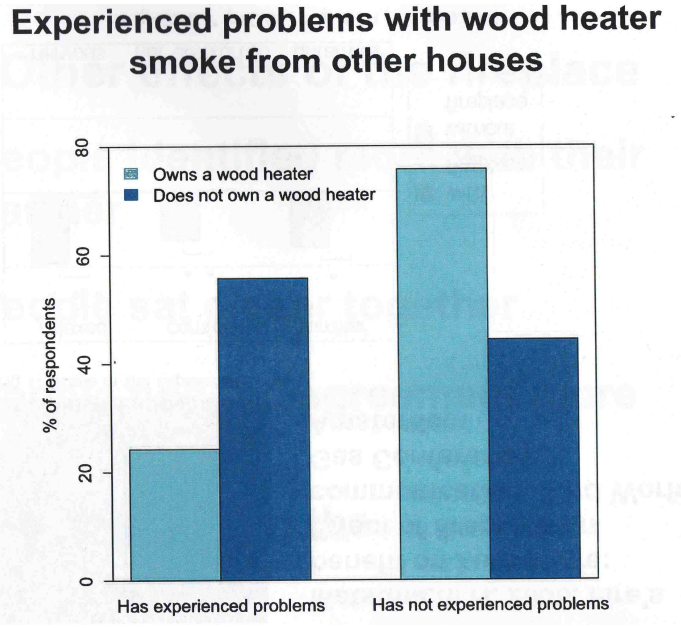
The EPA should develop a communications strategy to explain the health effects of PM2.5 pollution and increase public awareness of the main sources of PM2.5 emissions in major urban areas. This problem affects all of Australia, including Sydney (left) and PM2.5 pollution in Hunter Valley mining towns such as Muswellbrook.

Once the Montréalers understood that the average wood heater emits more PM2.5 pollution in just 9 hours than a mid-size car does in an entire year, there was general public support for not allowing new ones to be installed and phasing out existing heaters. This policy has led to a reduction in the number of smoggy days in winter (where PM2.5 concentrations exceed 35 µg/m^3 for more than 3 hours over 75% of Montréal) **from 29 in 2009 to 10 in 2013**.

Nowhere in world have education programs or wood-heater change-outs enabled people to use

log-burning heaters without creating harmful pollution. The photos above of brand new heaters in new houses in Armidale shows that new heaters add considerable amounts of harmful pollution to an overloaded airshed, despite owners having all relevant information on correct operation. When there is no safe level of pollution, authorities much strike a compromise between the health damage suffered by the community from permitting health-hazardous air pollution and the economic benefits of allowing that pollution. Vehicles and industry pollute, but the economic costs of not having vehicles or industry would be considerable. In contrast, because there are affordable, environmentally-friendly alternatives, there is little benefit in allowing new heating that is so detrimental to health that the NSW chief medical officer says is detrimental to health she supports banning and phasing them out in built-up urban areas.

The communication strategy should include TV adverts to improve public understanding of the health effects of woodsmoke, e.g. by comparing the health effects of woodsmoke with other pollution such as environmental tobacco smoke and car pollution. The compilation of advertising material from other health authorities, in particular the 30 second videos by Utah Physicians for a Healthy Environment and the San Francisco Bay Area 'Spare the Air' campaign, are good examples of what is needed to counter the biased information from the wood-heating industry, that, like the advertising from cigarette companies, is used to increase profits, even at the expense of public health.



5) The new policy should ensure assistance is provided to residents whose health or lifestyle has been affected by other people's woodsmoke. A survey of residents in the New England Region showed that almost 60% of residents that do not use wood heating sometimes or often experience problems because of other people's wood heating – see graph. There have been several complaints to Armidale Council about the brand new heaters with emissions ratings less than 2.5 g/kg shown above. Despite photographic evidence of plumes exceeding 10 metres in length (in the case of a new heater installed in August 2014, on one occasion lasting for at least 10 hours continuously) Armidale Dumaresq Council has not been able to do anything to help. The level of emissions shown has continued unabated. The POEO should therefore be amended to a) permit photographic and video evidence of the level of emissions, b) allow evidence in the form of PM2.5 measurements from appropriately-calibrated portable devices provided to residents affected by other people's woodsmoke and c) revise the definition of excessive smoke to anything that lasts for more than 10 minutes, other than very faint smoke that extends no more than 2 metres from the chimney.

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: EconomicAppraisal of Wood Smoke Control Measures[3]. An estimated 40,000 tonnes of PM2.5 are emitted from Australia's wood heaters (Federal Government CRIS), including 11,530 in NSW (OEH report, Table 17, p31) , with the health costs of woodsmoke in NSW estimated at $8.072 billion over 20 years if no remedial action is taken (Table 26, p46).

6) The new policy should ensure that that existing wood heaters are phased out when houses are sold and licencing fees introduced to cover the cost of woodsmoke-reduction strategies, including education programs and subsidizing the replacement of wood heaters with non-polluting alternatives. Just because the EPA has no current powers to require wood heaters to be removed when houses are sold doesn't mean that introducing legislation to achieve this is a bad idea. Given the estimated benefit of $4,015 million for a cost of just $36 million in NSW (and similar estimates for Victoria), it would be an extremely bad

idea not to introduce the necessary legislation. The EPA should therefore work towards the introduction of appropriate legislation.

7) Transparency. In the interests of transparent government, the EPA should publish a summary of all submissions received together with the full text of all submissions not listed as confidential.

Risk of legal action. In the absence of a health-based standard, if the installation of new heaters continues, there is a risk of legal action if residents suffer health damage from breathing woodsmoke. As noted above, five studies have now linked PM2.5 pollution to autism, as well as a considerable number of studies linking PM2.5 to heart attacks, strokes, lung diseases and cancers, at levels well below 25 ug/m^3, or even 20 ug/m^3, with even an increase of 2 ug/m^3 linked to a 0.32% decrease in brain volume and a 46% increase in covert brain infarcts. Councils should be advised that even a single wood heater can increase the downwind neighbour's PM2.5 exposure by more than 2 ug/m^3.

References and Further Information

To save space, references have been provided as hyperlinks to publicly available information on the web. Use the Cntrl+click keys to display the information.

Appendix 3 Wood heater smoke worse than pollution from mines and power stations, even in the Hunter valley.

PM2.5 is considered the most health-hazardous air pollutant; a recent study an increase of 2 µg/m3 in PM2.5 exposure was associated with a 0.32% smaller total cerebral brain volume and a 46% higher risk of covert brain infarcts, a type of silent stroke. Despite its proximity to mines and power stations generating electricity for 3.25 million homes, CSIRO's chemical fingerprinting showed that 62% of PM2.5 in Muswellbrook in winter was from domestic wood heaters – see graph below, despite only about 20% of households using wood heaters.

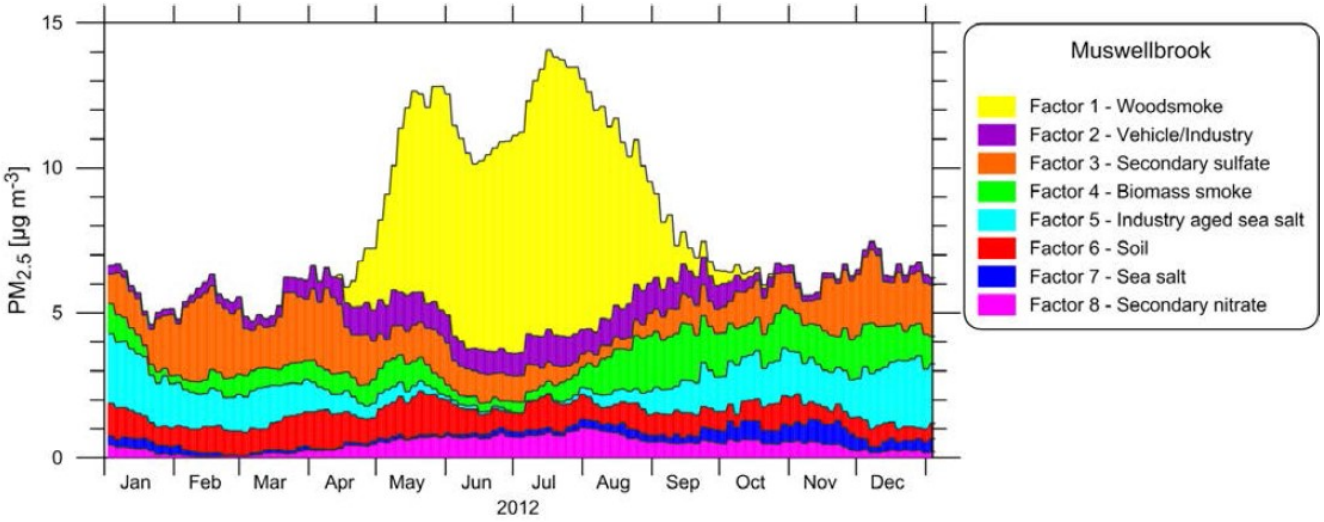


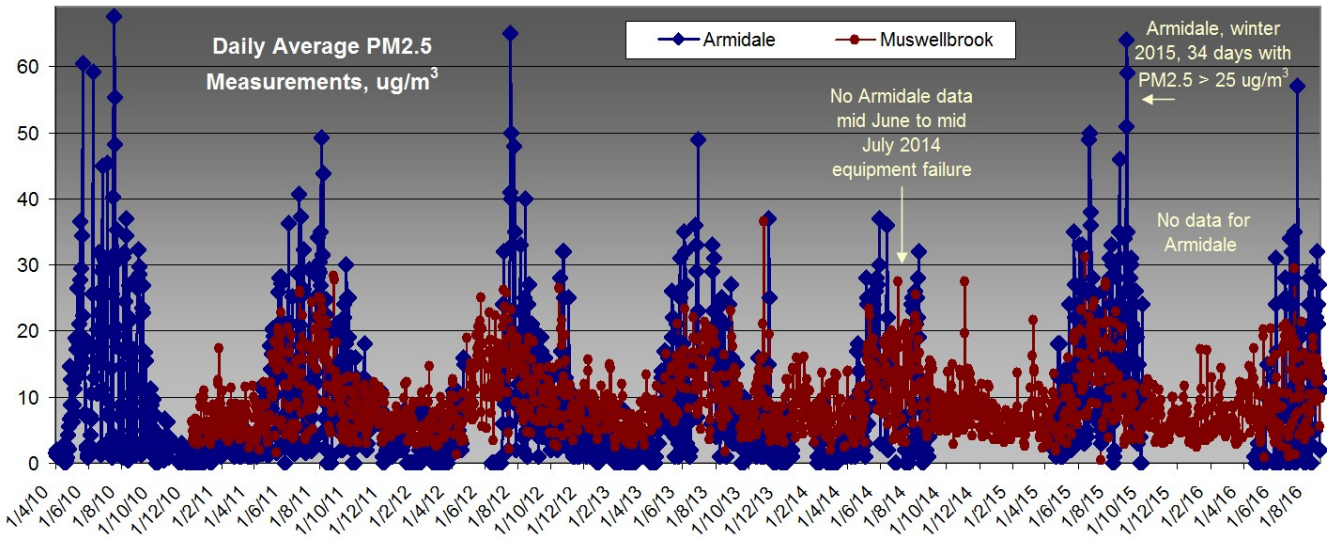
Figure 49. Time series (smoothed with 31-day running window) of the contribution of each factor to the total $PM_{2.5}$ in Muswellbrook

Towns with higher levels of wood heater usage (e.g. Armidale, NSW) are even more polluted in winter than the Hunter Valley (see graphs, overleaf). A recent talked by woodsmoke and health expert Dr Fay Johnston highlighted the failure of new standards, education or retrofitting catalysts have all failed to reduce emissions. The only effective solution is to switch to non-polluting, environmentally-friendly heating.

1. Aust, N., et al., *Methodology for valuing the health impacts of changes in particle emissions – final report*, 2013, PAEHolmes for NSW Environment Protection Authority (EPA).
2. 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.epa.nsw.gov.au/woodsmoke/smokecontrolopts.htm.
3. Weichenthal, S., et al., *Biomass Burning as a Source of Ambient Fine Particulate Air Pollution*

and Acute Myocardial Infarction. **Epidemiology, 2017. 28(3): p. 329-337.**

4. **AAQG.** ***Health experts advise that current wood heater models are too polluting to be allowed. Australian Air Quality Group. Available at: http://woodsmoke.3sc.net/health*. 2015.**



What has worked for Tasmania?

- Remove heaters ✓
- Improved heater emission standards ✗
- Education / improve use ✗
- Retro-fit catalyst technology ✗

Summary slide from Dr Fay Johnston's talk to the International Woodsmoke Researchers Network [1]