

Submission on Sustainable Cities 2025

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This submission deals mainly with wood heating in cities and the role that may be envisaged for it by other submissions and by the House of Representatives Standing Committee on Environment and Heritage. The Discussion Paper is referred to as DP.

Summary

Wood heaters cause serious smoke pollution, a problem that cannot be controlled by the certification of heaters and education of their owners. It can be controlled by enforcement of smoke regulations, but only at high and continuing financial cost. The only way to escape this cost and clean the winter air in our cities is to replace wood heaters by other forms of heating. If nothing is done about urban wood smoke, the financial and social cost of ill health due to it will remain very high.

Introduction

Nowhere in DP is there any mention of human health, probably because it is assumed that all the objectives to be pursued are conducive to health, among other benefits. This assumption may be incorrect, depending on what meaning is ascribed to “Australian lifestyle” and “renewable energy sources” on DP p 4. Lifestyle and renewability have both been used as arguments by proponents of wood heating, even though the smoke from wood heaters and fireplaces is a major cause of public ill health.

A major reason why people buy wood heaters and install fireplaces is the contribution of indoor ambiance to their lifestyle. EPA Victoria acknowledges that effective measures against wood smoke “*would mean a dramatic improvement in air quality at some times of the year*”, but is unwilling to take such measures because of “*the high cultural value placed on wood heating by the Victorian community*” (Ref 1). Instead, EPA Victoria proposes certification of heaters and education of their owners, both of which are ineffective measures, as shown below.

In a recent news report, modern wood heaters burning wood from sustainable sources are stated to be the most environmentally friendly form of heating (Ref 2). Apart from the fact that wood heaters are not greenhouse neutral, it is unreasonable to expect people to breathe wood smoke in order to reduce global warming.

The need for cleaner air

On DP p 14 we read that automobile dependence is a key reason for Australians being among the highest air polluters per capita in the world. Another reason, not mentioned in DP, is the widespread use of wood heaters in Australian cities. In some cities, for example Launceston and Armidale, unfavourable meteorology combines

with high usage of wood heaters to make wood smoke the major component of winter pollution, far exceeding vehicle exhaust.

The reason for reducing air pollution is so obvious that it is not mentioned in DP. It is the protection of human health from serious harm. NSW Health lists the body systems affected by the fine particles and air toxics in wood smoke: the respiratory, cardiovascular, nervous, reproductive, developmental and immune systems (Ref 3).

Striking proof of the benefit of putting solid-fuel domestic heaters out of action comes from Dublin, Ireland, where a ban on the sale of coal resulted in a 5.7% drop in non-trauma deaths, 15.5% in respiratory deaths and 10.3% in cardiovascular deaths (Ref 4).

Wood heaters and global warming

Firewood being burnt now comes from non-renewable sources and some is collected at great cost to the natural environment. Those who advocate wood heating on the grounds of greenhouse neutrality predicate their argument on renewable sources, which means plantations.

However, even plantations do not form a closed carbon dioxide cycle with wood heaters, which emit carbon monoxide and methane as well as carbon dioxide. The monoxide and methane have higher global warming potentials than the dioxide. Furthermore, the transport of firewood consumes fossil fuel.

Renewable biomass, including wood, can make an important contribution to reducing greenhouse gases, provided it is burnt efficiently in industrial installations with pollution controls or used to generate liquid or gaseous fuels. Domestic wood heating is not a good candidate for renewable energy generated at the single-dwelling level (DP p 6).

The failure of present wood-heater technology

Any wood heater can be made to smoke by choking its air intake. People do this for fuel economy and to keep a batch of wood smouldering through the night, so that they don't have to light the fire the next morning. Education campaigns to discourage this behaviour have failed, as described by Professor John Todd of the University of Tasmania: *"If householders took more care and were well informed on how to burn wood cleanly, smoke emissions could be significantly reduced. However, community education programs on correct woodheater use have been tried in Launceston since about 1992 (McDonnell and Todd 1997) and they seem to have made little difference. Perhaps the education programs were poorly designed and better approaches are possible, but several different groups have tried, with different approaches and no clear success has been observed. So, it is likely that education programs alone will not solve the wood-smoke problem, although they probably are having some beneficial effect, but not influencing the majority of woodheater users."* (Ref 5).

The laboratory tests used to certify heaters according to standard AS/NZS 4013 do not simulate domestic operation, and nobody has measured smoke emission from heaters in Australian homes. Professor Todd conducted a survey in which smoke plumes were observed visually and rated on a scale of 1 to 5 ranging from heat haze to dense smoke. Uncertified (older) and certified (newer) groups separated by a 10-year age gap were compared. I have read the values in Table 1 from a figure in Ref 6. They show no significant improvement due to certification.

<u>Table 1</u>		
Density of visible smoke from wood heaters		
	Uncertified	Certified
	1.5	1.3
	1.7	1.7
	1.75	1.7
	1.75	1.7
	2.25	1.75
	2.25	1.8
	2.3	2.0
	2.5	2.2
	2.5	2.3
	2.7	2.3
	3.0	2.5
		2.5
		2.7
		3.0
Average	2.2	2.1

The CSIRO tested four wood-burning appliances (Ref 7), which were found to rank from worst to best in the order: a certified heater (brand new), an uncertified heater (made in 1985), an open fireplace insert and another certified heater (brand new). The worst, in spite of having AS/NZS 4013 certification, was much worse than the others. These results suggest that the construction of a heater is not the major determinant of smoke from its chimney.

AS/NZS 4013 sets standards for wood heaters without and with catalytic combustors: 4 g smoke per kg wood without combustor and 2.25 g/kg with combustor. Heaters with combustor are too expensive to be saleable in Australia.

If enough resources were expended, smoke from wood heaters could be reduced by smoke patrols at all hours and fines for excessive smoke. Daytime patrols in Wagga Wagga in the winter of 2003 have had no observable effect on ambient particulate matter monitored by NSW EPA. Enforcement of smoke regulations has a high cost in staff time and possibly in legal expenses, a recurrent expenditure that will be required of cities for as long as wood heaters remain in use.

The promise of future wood-burning technology

Industrial installations offer the best prospect of burning wood cleanly, but it is conceivable that the inventive application of advanced technology may deliver clean-burning devices for domestic wood heating.

Much of this submission does not apply to pellet heaters, which are very different from the conventional heaters that burn chopped wood. They burn pellets of compressed sawdust, which are fed mechanically into the firebox and supplied with a forced draught of air. Like gas and electric heaters, they can be turned on and off, and they have an ambiance similar to that of log fires. They are new to Australia, and there is not enough published information to make a comprehensive comparison with other forms of heating.

Pellet heaters and domestic wood-burning devices yet to be invented may turn out to have slight health effects, high thermal efficiency, low greenhouse effect and prices competitive with gas and electric heaters. The introduction of such devices would not be impeded by steps to stop the installation of conventional wood heaters of the kind for which AS/NZS 4013 was written.

Energy conservation

The need for wood, gas and electric heating should be minimised by building design, insulation and solar heating, as exemplified by the 60L green building and Christie Walk (DP pp 15-18).

Conclusion

Conventional wood heaters being installed now will wear out about the year targeted by Sustainable Cities 2025. If they are still being installed then, the environmental degradation due to them will go on for at least a further 20 years. This will work against the measures envisaged in item 4 of the terms of reference: measures to reduce the environmental, social and economic costs of continuing urban expansion (DP p 3). Costs of these kinds due to wood heating include despoliation of woodland, penetration of smoke into neighbours' houses and the high financial cost, as well as pain and suffering, due to ill health caused by smoke.

The Inquiry into Sustainable Cities 2025 is a good opportunity to plan the demise of the wood-heating industry based on conventional heaters. While he does not advocate this, Professor Todd foresees its possibility: "*The next five years are likely to determine whether the firewood and woodheater industries virtually disappear from the residential energy mix in Australia, servicing only remote homesteads with imported appliances, or they continue as a new, environmentally responsible industry.*" (Ref 8). Changes in the residential energy mix do not inflict any great hardship on the heating industry; the oil heaters common in the 1970s disappeared without any controversy.

References

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3. NSW Department of Health (2003) *Wood smoke fact sheet: Wood smoke from wood-fired home heaters*.
4. L Clancy, P Goodman, H Sinclair and DW Dockery (2002) Effect of air-pollution control on death rates in Dublin, Ireland: an intervention study. *Lancet* 360: 1210-1214.
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