Chapter 6
Wood smoke

6.1 Emissions from domestic solid-fuel heating, commonly known as wood-fire heaters, were a key issue raised during the course of this inquiry. The committee was informed that planned burning and bushfires are also responsible for large releases of particulates which may be harmful to health.[1] Some submissions called for the emissions from hazard reduction, forestry and agricultural practices to be regulated within the same regulatory regime as other particulate sources.[2] Evidence around air pollution resulting from wood smoke, however, primarily concerned the use of wood-fire heaters in urban areas.

6.2 The Australian Bureau of Statistics (ABS) reports that one in ten households nationally use wood as the main source of energy for heating. Wood is more commonly used by households outside capital cities (19 per cent) compared with capital cities (5 per cent).[3] It was furthermore reported to the committee that emissions from wood heaters have continued to rise at the same time that more stringent regulations on motor vehicles and industry have continued to improve air quality.[4]

6.3 Several Australian governments highlighted wood smoke emissions as a key source of poor air quality. The ACT Environment and Sustainable Department also noted that '[wood smoke] is the largest source of particulate pollution in Canberra.'[5] Similarly, it was reported to the committee by the NSW EPA that:

> Wood smoke is a major source of winter particle pollution in Sydney and some regional NSW towns. On a winter weekend day in Sydney, the contribution of wood heaters to PM10 and PM2.5 particle pollution can be as high as 48% and 60%, respectively. Figures for colder climates, such as Armidale, are higher.[6]

6.4 The Asthma Foundation NSW provided a comparative health example of the impact of wood smoke pollution:

---

1 Centre for Air Quality and Health Research and Evaluation, *Submission 29*, p. 6.

2 Centre for Air Quality and Health Research and Evaluation, *Submission 29*, p. 6.

3 Australian bureau of Statistics, *Environmental Issues: Energy Use and Environment*, March 2011, available from: http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/4602.0.55.001Main%20Features5Mar%202011?opendocument&tabname=Summary&prodno=4602.0.55.001&issue=Mar%202011&num=&view= (4 June 2013).

4 Australian Air Quality Group, *Submission 94*, p. 2.

5 ACT Environment and Sustainable Department, *Submission 30*, p. 2.

6 NSW EPA, *Submission 80*, p. 33.

> The CSIRO estimates that the average new 4g wood heater actually emits about 10 grams of particles per kg of wood, therefore, an evening's heating (10kg fire wood) emits 100 grams of particles – more than smoke from 5 000 cigarettes. Per year, the average new wood heater in colder regions such as Armidale or Canberra emits more particle pollution than in the smoke of *1.85 million* cigarettes.[7]

6.5 The Asthma Foundation NSW also compared the emission standards of vehicles compared to those applicable to wood heaters:

> The Euro 5/6 regulations are so strict, and those for wood heaters so lax, that the average new wood heater in colder areas of NSW emit as much PM2.5 pollution as 370 new diesel SUV each travelling 20,000km per year.[8]

6.6 An area's topography and other natural features appear to strongly influence the nuisance of wood smoke. For example, Sydney's Camden Council reported that:

> During winter, the key factors contributing to the concentration of emissions in the south-west are exacerbated by temperature inversions and calm wind conditions. Temperature inversions which trap pollutants close to the ground surface and the calm wind conditions inhibit the dispersal of pollutants.[9]

6.7 Despite the relatively low numbers of wood heaters in use, it was argued to the committee that they are responsible for a large amount of air pollution in some metropolitan areas. For example, the Tuggeranong Community Council stated that:

> In Canberra, and in many other towns and cities across Australia, we have a very small number of households responsible for the majority of our air pollution. In winter particle pollution increases threefold in Canberra.[10]

6.8 It was suggested by the Asthma Foundation of NSW that during winter wood heaters account for up to 85 per cent of particulate matter in Armidale.[11] The NSW EPA similarly reported:

> The use of solid-fuel heaters during winter can be a significant source of fine particle emissions throughout NSW. PM10 data shows that exceedences in the Sydney region, especially during autumn and winter, tend to be strongly local events confined to a few sites, rather than widespread.[12]

---

7 Asthma Foundation NSW, *Submission 50*, p. 22.

8 Asthma Foundation NSW, *Submission 50*, p.21.

9 Camden Council, *Submission 143*, p. 1.

10 Tuggeranong Community Council, *Submission 3*, p. 1.

11 Asthma Foundation NSW, *Submission 50*, p.20.

12 NSW EPA, *Submission 80*, p. 15.

6.9 The Department of Sustainability, Environment, Water, Population and Communities also recognised that 'In winter, wood smoke from domestic heating contributes a significant amount of particulate pollution in some regions.'[13]

6.10 The industry peak body – the Australian Home Heating Association (AHHA) – stated that:

> As an industry we recognise the poor operation of wood heating appliances can contribute to air quality concerns within certain areas of Australia, particularly those that sit within valleys and often experience inversion layers which traps and holds fine particles close to the ground.[14]

6.11 For most homes with wood heaters in cities and towns there are viable, less polluting alternatives. For the majority of homes with wood heaters however, the reasons given for their use are the high cost of electricity, a lack of alternatives, and because of the ambiance of wood heaters.[15] The Armidale Dumaresq Council provided evidence that alternatives need to be available that address the appeal of wood heating for many – namely cost:

> [The] Council believes that at the heart of this problem and its resolution is the ability for communities in cold climate areas such as Armidale to have access to more environmentally sustainable heating media. Not only should the appliances and their fuel be affordable for all households, the systems offered should be capable of operating in a less polluting fashion in relation to both indoor and outdoor air quality, while being based on a sustainable energy source.[16]

Costs of action and inaction

6.12 The NSW EPA reported that the additional health costs attributable to the impact of wood smoke by 2030 could be up to $8 billion in NSW alone.[17] In addition to the economic costs associated with wood smoke there are the impacts on individuals to consider. The Armidale Dumaresq Council explained:

> Short-term exposure (over hours or days) to high levels of wood smoke may cause eye and respiratory tract irritation, aggravate asthma or worsen heart disease, while long term exposure to particulate matter can decrease lung function like angina and chronic bronchitis. All these can lead to increase dependency on medication and potential hospitalisation and shorten life expectancy.[18]

6.13 Research conducted by Sinclair Knight Merz on behalf of the NSW Department of Environment, Climate Change and Water using cost curves to rate cost

---

13 SEWPaC, *Submission 82*, p. 6.

14 Australian Home Heating Association, *Submission 20*, p. 1.

15 Cleanairtas, *Submission 81*, p. [12].

16 Armidale Dumaresq Council, *Submission 158*, p. 5.

17 NSW EPA, *Submission 80*, p. 34.

18 Armidale Dumaresq Council, *Submission 158*, p. 3.

effective emission reduction actions found that the regulating new wood heaters is the most cost effective (per tonne of emissions reduced) means to reduce air pollution in that State.[19] In relation to Sydney, the report found that improving wood heater pollution standards to 1g/kg would represent 1 per cent of the cost of meeting the air quality targets of the NEPM, while representing 66 per cent of the necessary abatement in PM10 levels.[20] To summarise in the words of the NSW EPA: 'national standards for wood heaters would bring about the largest emission reductions for PM10 in Sydney at the least cost.'[21]

6.14 Evidence from Tasmania shows that reducing the pollution from wood heaters results in tangible health benefits. Following Launceston's $2 million wood smoke reduction program it was reported that between 2001 and 2004 the number of households that used wood-burning stoves fell from 66 to 30 per cent, and wintertime particulate pollution reduced by 40 per cent. This appears to have correlated with a reduction in all-cause mortality and associated costs.[22]

Regulation

6.15 Emissions caused by wood heaters are currently the subject of various Australian Standards, in particular AS/NZS 4013 – *Domestic Sold Fuel Appliances – Method of determination of flue gas emissions* which was introduced in 1999. Standards Australia is the peak non-government standards organisation. Standards developed are called Australian Standards and are not binding documents. Governments may however choose to apply a relevant standard through their own legislation.[23]

6.16 Each Standard is developed through the work of a technical committee, which 'is a balanced and representative group of specific users, industry, government, community and other interested parties'.[24] The process followed includes the establishment of a committee, the release of a draft for public comment, consideration of revisions, and ultimately a ballot of the committee.[25] The balloting aims at consensus, and thus the rules governing adopt of a new standard are:

a) A minimum of 67% of those eligible to vote have voted affirmatively; and

b) A minimum of 80% of votes received are affirmative; and

---

19 NSW EPA, *Submission 80*, p. 38.

20 Sinclair Knight Merz, *Cost Abatement Curves for Air Emission Reduction Actions*, 28 May 2010, p. 63, available from: http://www.environment.nsw.gov.au/resources/air/CostCurveAirEmissionRedn.pdf (4 June 2013).

21 NSW EPA, *Submission 80*, p. 40.

22 Australian Air Quality Group, *Submission 94*, p. 4.

23 SEWPaC, *Supplementary Submission*, p 3.

24 Standards Australia, *Submission 162*, p. 2.

25 Standards Australia, *Submission 162*, p. 2.

c) No major interest involved with the subject of the Standard has collectively maintained a negative vote.[26]

6.17 The key standard for wood heaters is a maximum flue gas emission in a controlled test of 4 grams of particulate matter per kilogram burned (4g/kg). Appliances sold on the Australian market must in turn display a compliance plate indicating that the device has met the 4g/kg emissions standard in testing.[27] There is currently no efficiency requirement in the AS/NZS 4013.[28] However, to comply with AS/NZS 4012 the efficiency result must be reported on a label permanently attached to the appliance.[29]

6.18 The stipulated standards are only relevant however, if they are enforced. The AHHA queried whether this was currently the case:

> Any certification scheme is effective only to the extent that it is legally enforced. This is clearly a major opportunity for improvement. The AHHA has been concerned for some time at the lack of regulatory enforcement of the current woodheating certification scheme. There are several documented cases where we have notified the state EPA of woodheaters for sale that have either not been certified or which substantially differ from their certified design. In each case we either do not receive a reply, or are told there simply isn't the resource to investigate and follow up.[30]

6.19 As well as regulating wood heaters at the point of sale, there is a significant difference between laboratory testing and real-world application. The standards applied to wood heaters are tested in a laboratory, but these are rarely reproduced once a unit it installed. As explained by the Asthma Foundation NSW:

> A significant reduction in particle emission level is required to produce a sizeable reduction in air pollution because with the operation of domestic fires you have to consider 'real life emissions' not laboratory emissions, which are often much higher as many wood stoves are not being operated correctly, not using the correct wood and have not been cleaned for some time.[31]

6.20 The AECOM report Economic Appraisal of Wood Smoke Control Measures reported that:

> Tests conducted for the Australian Department of Environment and Heritage concluded that the increase in the emission factor when in-service was approximately 2.5 times the certified level of grams per kilogram of fuel. This figure accounts for the operation of wood heaters outside testing

26 Standards Australia, *Submission 162*, p. 3.

27 Armidale Dumaresq Council, *Submission 158*, p. 4.

28 Australian Home Heating Association, *Submission 20*, p. 7.

29 SEWPaC, *Supplementary Submission*, p 3.

30 Australian Home Heating Association, *Submission 20*, pp. 6–7.

31 Asthma Foundation NSW, *Submission 50*, p. 22.

> parameters and the fact that wood heater owners do not generally operate the wood heater in an optimal manner.[32]

Regulating emissions

6.21 Individual States and Territories have the responsibility of monitoring and regulating emissions from wood heaters, a power often delegated to local councils. In NSW for example, the committee was informed that:

> Under the [*Protection of the Environment Operations Act 1997*] councils have the power where they are the appropriate regulatory authority to issue prevention notices to prevent pollution and specific powers to issue prevention notices and smoke abatement notices against people creating excessive smoke from wood heaters.[33]

6.22 Across Australia a number of States and Territories and local governments have taken measures to minimise and manage wood smoke from domestic heaters. In NSW the government has announced in excess of $1 million dollars' worth of grants available to NSW councils for wood smoke reduction programs in the winters of 2013 and 2014. Programs include education initiatives, local enforcement programs and targeted rebates to remove old heaters.[34] The ACT government reported a number of measures to address to issue of wood smoke:

> This involves public education and enforcement activities, the licensing of firewood merchants, implementation of the 'Don't Burn Tonight Campaign' and the on-going implementation of the Wood Heater Replacement Program.[35]

6.23 The committee also heard that the ACT government 'supports the prohibition on wood heaters in new development areas where planning studies show that they would have an adverse impact on air quality.'[36] Prohibitions have already been introduced in a number of new developments around Canberra.[37]

6.24 The committee heard that the Armidale Dumaresq Council has implemented more stringent standards for wood heaters within the Council's jurisdiction:

> Since 2010 we have introduced a Local Approvals Policy under the NSW Local Government Act 1993 which requires wood heaters installed in new homes in our urban area to have an AS 4013 tested emission rating of 2.5g/kg and 3g/kg for all other homes…We are currently exhibiting an

---

32 AECOM, *Economic Appraisal of Wood Smoke Control Measures – Final Report*, June 2011, p. 19.

33 NSW EPA, *Submission 80*, p. 33.

34 NSW EPA, *Submission 80*, p. 34.

35 ACT Environment and Sustainable Department, *Submission 30*, p. 2.

36 ACT Environment and Sustainable Department, *Submission 30*, p. 2.

37 ACT Environment and Sustainable Department, *Submission 30*, p. 2.

> amendment to this Policy which would extend the 2.5g maximum test emissions requirement to all urban wood heater installations.[38]

6.25 The committee received evidence that the Camden Council:

> [R]esolved on 21 July 2012 to only allow the installation of wood heaters that have a maximum emissions rate of 1g/kg of fuel burnt and a minimum efficiency rate of 65%. These criteria are a significantly higher standard than the 4g/kg and no minimum efficiency that is currently in place in NSW.[39]

6.26 The AHHA reported that of the 300 wood heater models currently available to the public, only four imported models would comply with the standards imposed by the Camden Council.[40]

6.27 The AHHA called for a nationally consistent approach to regulating wood heaters:

> The AHHA would like to see a nationally consistent level of emission requirements, rather than break-away councils requiring individual emission levels in specific areas.[41]

Attempts at strengthening national standards

6.28 There was a lot of discussion during the inquiry regarding the process for tightening wood smoke regulation, particularly through a stricter Australian Standard. The committee sought information from Standards Australia as well as from witnesses regarding the process and current proposals.

6.29 Australian Standards in relation to wood heaters began with a standard from the early 1990s, which was then revised and issued as a joint Australia-New Zealand standard on the measurement of flue emissions, promulgated in 1999 and designated *AS/NZS 4013:1999 Domestic solid fuel burning appliances – Method for determination of flue gas emission*.[42]

6.30 A process of revision of the standard by a technical committee (referred to as CS–062) began in 2003. This resulted in the release of a succession of drafts for comment, in November 2003, December 2004 and again in October 2006.[43] Despite these extensive discussions, the results of a ballot of committee members indicated there was not consensus on the proposal. Following further discussion, consensus was still not reached and the project was 'placed in abeyance' as a result.[44]

---

38 Armidale Dumaresq Council, *Submission 158*, p. 4.

39 Camden Council, *Submission 143*, p. 2.

40 Australian Home Heating Association, Submission 20, p. 8.

41 Australian Home Heating Association, Submission 20, p. 8.

42 Standards Australia, *Submission 162*, p. 4.

43 Standards Australia, *Submission 162*, p. 4.

44 Standards Australia, *Submission 162*, p. 5.

6.31 Based on the minutes of the Standards Australia committee tabled by the AHHA, it appears that the committee agreed to a reduction in the proposed emission standard to 3g/kg but did not minute any action items. Industry representatives on the committee were given two weeks to consult with their membership about a further reduction of the emission limit to 2g/kg, and report back to the committee within two weeks.[45]

6.32 What transpired following this meeting was subject to conflicting evidence provided to the committee. The Department reported that 'the process stalled in 2007 and no action was taken on revising these Australian Standards at that time'.[46] The Australian Air Quality Group (AAQG) argued that:

> The Australian wood heating industry vetoed recommendations that were approved 15 votes to four by the Standards Australia committee to halve the emissions limit and put health warnings on wood heaters.[47]

6.33 This claim was strongly disputed by the AHHA who argued that no decision had actually been taken by the Standards committee, and that during its two week consultation window the Standards committee and its associated projects were suspended in a Standards Australia reshuffle:

> I am on the standards committee...During that committee, the discussion was had by all committee members that there would be a reduction in the emission level for solid fuel heating appliances. I represent the industry as a whole, and during that discussion I requested that I go back to manufacturers and discuss this with them, and then respond to the committee within a two-week period. That is in the minutes that are recorded there that I have handed up to [the secretariat]. During that two-week period, I had gone back to the industry and there was discussion, but in the meantime Standards Australia had a major reshuffle, and all our projects on the committee were shelved. The committee was basically made defunct. There was nothing I could do about that.[48]

6.34 The committee received evidence from the Australian Air Quality Group in the form of an email dated 24 April 2007 that appears to indicate that Standards Australia tabulated the position of committee members regarding reducing the emissions standard to 2g/kg. Two of the four manufacturing representatives were recorded as being opposed to the measure and it did not proceed further, as this violated the requirement that consensus include no 'major interest' maintaining its opposition.[49]

---

45 Minutes of Standards Australia Solid Fuel Burning Appliances Committee – 15/16 March 2007, tabled by the Australian Home Heating Association, 17 May 2013, p. 3.

46 SEWPaC, *Supplementary Submission*, p 3.

47 Dr Robinson, Australian Air Quality Group, *Committee Hansard*, 17 May 2013, p. 10.

48 Mrs Brown, Australian Home Heating Association, *Committee Hansard*, 17 May 2013, p. 21.

49 Additional information provided by the Australian Air Quality Group, received p. 1.

6.35 Having reviewed the evidence from Standards Australia it appears clear that the process did not halt as a result of changes within Standards Australia: it was the result of a failure of the technical committee to reach consensus within the meaning of Standards Australia's rules, which according to the minutes supplied to the committee was a result of opposition from industry representatives.

Suggested standards

6.36 The Asthma Foundation recommended that the particle emission level per kilogram of dry wood burnt be reduced from the current 4g/kg to 1g/kg in order to bring Australia into alignment with international standards.[50] Cleanairtas argued that in urban areas a 2g/kg limit, at a minimum, was required.[51]

6.37 The appropriateness of the international standard cited by the Asthma Foundation of 1g/kg was questioned by the AHHA noting the differences in fuel used in Australia (hardwood), and also arguing that emission standards need to be read in conjunction with efficiency standards.[52]

6.38 The AHHA informed the committee that industry was currently advocating for tighter emissions standards for their products:

> As the peak body which represents the Solid Fuel Heating industry, we have put forward a proposal to Standards Australia to have the National Standard for wood heating appliances changed from 4g/kg of particulate matter per kilo of wood burnt to reduce this down to 2.5g/kg…Should the government departments represented on the [Standards Committee][53] agree to these recommended changes, the emission level will reduce from the current National Standard of 4g/kg to 2.5g/kg with an efficiency requirement of 55% enforced by May 2015 and then further reduced to 1.5g/kg and 60% by 2019.[54]

6.39 Standards Australia advised that a new proposal to revise the standard was received in September 2011; the project formally commenced in May 2012, and that a draft standard is expected to be released for comment around October 2013.[55]

Committee view

6.40 Based on the evidence heard the committee considers that it is necessary to implement emission and efficiency standards for all newly installed wood heaters. Those standards need to be significantly stricter than those currently in place. The

---

50 Asthma Foundation NSW, *Submission 50*, p. 22.

51 Cleanairtas, *Submission 81*, p. [12].

52 Australian Home Heating Association, *Answers to questions on notice*, 5 June 2013, p. 2.

53 CS-062 is a Standards Australia committee revising AS/NZS 4013. Further information regarding the committee can be found here: http://www.sdpp.standards.org.au/ActiveProjects.aspx?CommitteeNumber=CS-062&CommitteeName=Solid%20Fuel%20Burning%20Appliances#simple1

54 Australian Home Heating Association, *Submission 20*, pp. 5–6.

55 Standards Australia, *Submission 162*, p. 6.

committee was disturbed by the disproportionate contribution made by wood smoke to urban air pollution, given the relatively small number of households using it as a heating source.

6.41 The committee noted that industry and regulatory bodies appear to have already come to an understanding that better regulation should be in place. Wood heaters are used elsewhere in the world in a safer manner which provides a more appropriate balance between the needs and desires of individuals and the community at large. Appropriate regulation including both efficiency and emissions standards will be a step towards finding that balance in Australia.

6.42 The committee notes that local environmental conditions can have a significant effect on the polluting consequences of wood smoke and that it can therefore be appropriate that local planning regulations impose specific conditions to reflect those environmental conditions.

Recommendation 12

6.43 The committee recommends that Australian Governments immediately adopt minimum efficiency and maximum emission standards for all newly installed wood heaters in Australia.

Recommendation 13

6.44 The committee recommends that local councils continue to manage the use of wood heaters in their own jurisdictions through the use of bans, buy-backs, minimum efficiency standards, and other mechanisms as appropriate to protect the health of their local communities.

Senator Rachel Siewert

Chair