LEGISLATIVE ASSEMBLY FOR THE AUSTRALIAN CAPITAL TERRITORY

"THE BURNING QUESTION"

A DISCUSSION PAPER ON FUELWOOD HEATING IN THE ACT

BY

THE STANDING COMMITTEE ON
CONSERVATION, HERITAGE AND ENVIRONMENT

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Introduction

1. As part of a broader reference on integrated energy resources, the committee is giving attention to fuelwood heating and associated matters such as air quality related to the use of solid fuel appliances, the health effects of airborne particulates in wood smoke, heater operation and fuelwood supply.

1.1 Winter in Canberra is synonymous with brown haze, a result of fires being kindled and motor vehicle emissions combining with cold air flows, temperature inversions and the topography of the Canberra region. The community overall is affected in various ways. For some, brown haze and fuelwood smoke is a nuisance, for others it poses a health hazard. Yet others are concerned about the growing demand for fuelwood and the effect of this on the environment.

1.2 This discussion paper attempts to address these concerns. Hopefully it will stimulate interest within the community and prompt individuals and organisations to comment to the committee directly on the issues as presented.

1.3 The paper reflects the views of a number of individuals and organisations taken mainly from submissions to the committee in connection with the broader energy reference, but without the benefit of exploring these views in detail at public hearings. However, the committee believes that with the approach of winter, the issues are of sufficient importance that it is timely to invite comment on this discussion paper now rather than proceed by the usual means of a public hearing to canvass community views.

1.4 The paper has also benefited from a research paper on wood–smoke reduction provided by Dr John Todd, Co–ordinator of Environmental Studies at the University of Tasmania and from submissions by the ACT Governmental authorities, in particular the Department of Urban Services.

1.5 The committee has not fully worked through final views, but has indicated some possible conclusions which could be drawn from examination of the material before it.

1.6 In making its report to the Assembly, the committee will take account of comments received on this paper. Comments should be made to the committee by 17 May 1991.

2. Solid Fuel Appliances

2.1 Solid fuel heaters are an attractive and, when used correctly, an effective form of home heating. Operated incorrectly they cause significant amounts of air pollution, emitting inhalable particles, soot, ash and tars. Where these solids do not escape to the atmosphere they build up in the flue where they can further reduce the effective operation of the heater thus increasing the amount of emissions vented to the atmosphere.

2.2 More generally, solid fuel is one of a number of forms of energy. The amount of heating and hot water generated by solid fuel appliances is determined in part by the efficiency of the appliances. This in turn affects the amount of energy required and the quantity and types of emissions. This interrelationship is a central factor in the problems arising from using solid fuel heaters, and it is discussed in more detail later in this paper.

3. Air Quality in Canberra

3.1 Because of topography and weather patterns, Canberra is prone to pollution episodes, particularly in autumn and winter when low level temperature inversions trap pollutants in the stable air under the inversion layer. At these times, the air quality deteriorates markedly due to motor vehicle and heater emissions. Woodheater emissions are a visibly obvious source of this pollution and make a significant contribution to Canberra's "brown haze" problem. Brown haze been the subject of many complaints to, and articles in, the Canberra media.

3.2 Analysis of air in Civic and Kambah in the Tuggeranong Valley by the Centre for Resources and Environmental Studies (CRES) at the Australian National University indicates that motor vehicle emissions are the dominant source of Civic airborne particulates and that while these are also important contributors in Kambah, the dominant source of particulates there is from woodheaters and open fireplaces.

3.3 An interim conclusion by CRES is that woodburning is responsible for a significant proportion of the non–background particulate pollution in both the commercial and suburban areas in Canberra during winter months, and especially at night. The committee therefore considers that a strategy is needed to control emissions from this presently uncontrolled pollution source.

3.4 Common criticisms about air pollution by wood smoke include:

- it is a health hazard
- it detracts from Canberra as an attractive, modern and clean capital city
- wood burning fireplaces are anti–social and a nuisance. Smoke and emissions hinder the enjoyment of outdoors activities and soil washing
- smoke odours are an unpleasant characteristic of the Canberra winter, with smoke invading neighbouring houses
- backyard chainsaws cause noise pollution
- wood burning adds to the greenhouse effect
- Some Canberra suburbs in mid–winter must be like an English industrial town at the height of the industrial revolution

4. Health Effects of Airborne Particulates in Wood Smoke

4.1 It was submitted to the committee that fine particlulates in the inhalable range are a direct health risk, and that indirectly they affect health and well being through their effect on solar radiation and rainfall.

4.2 In theory, the complete combustion of wood, which is essentially cellulose bound with lignin, produces only carbon dioxide and water. However, in practice this never occurs mainly due to the complex nature of the combustion process and the great difficulty in controlling it.

4.3 When wood burns a series of complex chemical reactions takes place. More than 100 chemicals have been identified in emissions from burning wood. The major pollutants in Canberra from all sources including motor vehicles, industrial and solid fuel burning are carbon monoxide, carbon dioxide, nitrogen oxides, suspended particles, lead and fine particles. Many of these are respiratory irritants.

4.4 Air monitoring information has been collected by the ACT Community and Health Service and collated by the National Air Quality Data Centre since 1982. Using this data, the National Capital Planning Authority (NCPA) reports that the highest fine particle concentrations are found at night, between 7pm and 2am, in the winter months from May to August. This is thought to be a combination of calm weather conditions and a mixture of emissions from wood fires and to a lesser extent motor vehicles. A smaller peak occurs in the early morning, between 7am and 10am for the months of February to August, probably due largely to vehicle emissions during peak traffic[1].

4.5 The committee notes that the potential health risk of pollutant emissions by solid fuel heaters is intensified by their near ground level release from the average suburban household chimney. Problems arise when the concentration of emissions in ambient air exceeds a safe limit. This can be influenced by the number of heaters in an area and the rate of dispersion of smoke. Localised pollution usually involves relatively undiluted emissions from individual heaters entering nearby houses. Area pollution results from the accumulation of emissions from a great many heaters in an area airshed.

4.6 Factors contributing to this are the type of fuelwood, how it is burned, heater design, heater operation, flue height, siting of houses, house design, local topography, weather and temperature inversions.

4.7 The committee notes that significant direct action to control air pollution from leaded petrol has been instituted with Australian Design Rules requiring the registration of only those new vehicles which are fuelled by unleaded petrol. Although car emissions are of continuing concern and remain an important focus for future air quality monitoring, the fact is that something has and is being done about the problem. However, in the area of fine particle air pollution where solid fuel heating emissions are a contributing factor, there is a lack of controls and this has implications for public health.

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1 Canberra's Environment 1989. State Of The Environment In The National Capital And The ACT. National Capital Planning Authority, June 1989 p 6.

4.8 The committee observes that population growth will influence air quality in the ACT, and increased emissions associated with increased population may offset the gains achieved through pollution control measures. Therefore it is vital that air quality continue to be monitored especially in those areas which are presently showing high concentrations of particulate and other emissions.

4.9 In this regard the committee notes that the National Health and Medical Research Council (NHMRC) has prepared health guidelines relating to a mixture of coarse and fine particles known collectively as Total Suspended Particulates (TSP) and other air pollutants. However, there is no guideline for fine particle pollution, which can affect the health of people[2]. It would appear to the committee that there is a case for adopting a Canberra standard for air pollution covering particulates based at the minimum on the NHMRC guidelines for TSP and other pollutants.

4.10 Some possible conclusions are that the Government initiate measures to:

(a) maintain continuous monitoring of air quality throughout the ACT, with particular attention to those areas which are prone to high emission levels.

(b) institute a public air quality advisory service during the months of peak emission pollution, with warnings of particulate pollution being publicly notified on a daily basis through the ACT media.

(c) determine as a matter of urgency whether existing levels of fine particle and other air pollutants are or are close to posing a health threat to the community.

(d) adopt as an interim measure the NHMRC guidelines for TSP and other air pollutants as the minimum health standard for ACT levels of fine particle and other air pollutants.

(e) implement control mechanisms for fine particle and other air pollution.

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2 ibid, p 6–10.

5. Wood as a Fuel

5.1 The correct use of wood heaters will increase heating efficiency and minimise air pollution.

5.2 Using dry wood is vitally important but many operators burn wet or green wood. The moisture content of green wood is about 50 per cent and for fully air dry wood about 12 per cent. The use of wet or green firewood substantially reduces heat output because a significant amount of heat must be used to drive off the moisture in the form of steam. It should be noted that especially with the burning of wet or green wood, visible flue smoke indicates not only particulate emissions but also water vapour.

5.3 Burning wet or green wood also causes premature formation of creosote in the chimney or flue. This clogs the flue to the point where the fire cannot draw properly, and more wood is used to get the fire going and to maintain it. This in turn adds to the pollution. It also means unnecessary use of fuelwood.

5.4 A tonne of green wood produces about half a tonne of water when burned. This goes up the chimney, condenses and falls over the surrounds including neighbouring properties.

6. Heater Operation

6.1 The use of solid fuel heating and indeed the effect of air pollution is not even throughout Canberra. This reflects the popularity of such heaters at different stages of Canberra's development. Tuggeranong was being developed when solid fuel heaters were particularly popular and cheaper to operate as electricity costs were rising. The large proportion of Tuggeranong houses with solid fuel heaters coincides with the peculiarities of air drainage in the Murrumbidgee basin, which presents more severe emission problems than other basins such as Belconnen.

6.2 Solid fuel heaters range from the traditional open fireplace and pot–belly stoves to high tech slow combustion cookers and heaters.

6.3 About 90 per cent of the heat from open fireplaces is lost through the chimney. Pot–belly stoves lose about 70 per cent heat through the flue, and slow combustion heaters about 30 per cent. About two or three times more wood is used with open fire heating for the same amount of heat as is generated by a slow combustion heater.

6.4 Selection of the appropriate heater to perform a particular task plays a key role in emission levels. For example, the committee noted that some users select heaters which have a heat output much greater than what is required. They then compensate for this by operating their heaters at a low level of burning, which then produces a great deal more smoke than would otherwise be the case.

6.5 Low burning, especially late at night can cause a fire to smoulder and emit higher levels of smoke. Unless a fire is established quickly, it will smoulder. Wood added to a low fire without kindling to stoke up the flame will also increase the quantity of smoke produced.

6.6 Most solid fuel heaters now being marketed are regarded as efficient with minimum pollution if installed and operated correctly. Poor operating practices continue to be the major cause of smoke and particle pollution despite the comprehensive educative material about fuelwood heaters put out by heater manufacturers and governments. The committee noted that the ACT Department of Urban Services has produced and made available for some time the informative brochure "How to choose, Use and Operate Solid Fuel Appliances". While this brochure and other advisory material has been widely distributed in retail outlets there has been little apparent effect on the way people operate their heater.

6.7 Proper installation and correct use of the right solid fuel heating appliance for the intended purpose will benefit users, substantially reduce smoke, and minimise the amount of harmful emissions to the atmosphere.

6.8 The Department of Urban Services advised the committee that individuals, particularly in the Tuggeranong area continue to ignore the proper operating procedures.

6.9 The committee considers it unreasonable that a few should be allowed to make life uncomfortable, difficult and even unhealthy for everyone.

6.10 The Air Pollution Act 1988 prescribes emission quality standards and sets out the criteria used by the Pollution Control Authority regarding the control of industrial atmospheric pollutants. It also specifies requirements relating to burning material in the open, including in backyards. However, the Act excludes domestic dwellings from the requirements relating to emissions. Accordingly, the Authority is unable to take direct action to minimise air pollution from solid fuel heaters and other appliances.

6.11 Notwithstanding efforts to encourage the correct use of solid fuel heaters and the co–operation of most users, human nature is such that nuisance burning will inevitably continue. Other than counselling offenders and mediation, the ACT Administration has no powers to prevent this. However, the committee does not consider mediation alone an effective way to deal with an issue posing real and potential dangers for the health and wellbeing of the general community.

6.12 Some possible conclusions are that the Government:

(a) develop a higher profile publicity campaign, including use of television in preparation for autumn/winter 1991, directed at householders reviewing the efficiency of their existing fuelwood heaters and urging correct heater operation.

(b) implement more effective means of educating the public on selection of appropriate solid fuel appliances and creating a higher awareness of clean burning practices.

(c) review the Pollution Control Authority's powers in relation to pollution caused by solid fuel appliances, and legislate to remove any deficiency in those powers which prevent the control of emissions from household solid fuel appliances.

7. Design and Emission Standards For Solid Fuel Appliances

7.1 Design characteristics have a key role in emission levels. Expert opinion is that Australian and New Zealand heaters generally have a good reputation for their clean burning performance. Until recently there were no design standards to take account of characteristics required for clean burning performance. However, the committee notes that the Standards Association of Australia (SAA) has now issued draft standards covering performance and emissions covering design features and methods for testing emissions.

7.2 As the largest inland centre where emissions are a concern, this draft standard will be of particular relevance to Canberra. Design is also critical to the possibility of misuse of appliances, and the committee would urge that the ACT government closely examine the draft standard with a view to recommending to the Standards Association that it make provision for foolproof operation in order to further minimise the extent of harmful emissions.

7.3 Inadequate installation of heaters and flues contributes to the pollution problem and the SAA has developed standard AS 2918 covering installation of solid fuel appliances. This standard which is incorporated into the ACT building regulations provides inter alia that a heater flue when within three metres of the roof ridge must be 600 mm above the top of the ridge, and where it is more than three metres from the ridge it must be 900 mm above the ridge. For flat roofs the flue must be 1.5 metres above the roof. The purpose of these heights is to facilitate air flows and aid the dispersal of emissions.

7.4 In especially problematic locations of the ACT it may become necessary to require installation of very low emission heaters.

7.5 A possible conclusion is that the Government establish codes for the installation of heaters in problematic areas of the ACT.

8. Existing Inefficient Appliances

8.1 The adoption of clean burning standards and installation of only those appliances which meet those standards would not mitigate the effects of existing appliances which do not conform to that standard. It is not known how many heaters currently in use in the ACT would be in this category, and should a standard be adopted the government should undertake a survey to establish the facts. Once these are known, the government should consider options for encouraging the upgrading or replacement of those appliances which do not meet the standard.

8.2 Options which could be considered include interest free loans, subsidies for conversion or purchase geared to the age and condition of existing appliances and free inspections and advice on conversions or replacement of appliances.

8.3 A possible conclusion is that the Government consider providing incentives to encourage conversion or replacement of existing inefficient solid fuel appliances.

9. Fuelwood Demand

9.1 An estimated 20,000 homes in Canberra are fitted with solid fuel appliances, and they use an estimated 80,000 tonnes of fuelwood a year. The conversion of existing ACT homes to include wood heaters over the five years to 1989 was 12 per cent.

9.2 The ACT Housing Trust does not install wood burning stoves in new houses, and is gradually replacing them with gas and electric heating where they exist in established dwellings.

9.3 Woodfuel was the main energy source for space heating in Canberra until the 1960's when conversion to oil, electricity and gas considerably reduced the demand for fuelwood. However, with the oil price shocks of the 1970's, and the development of more efficient fuelwood heaters, oil heating fell from favour.

9.4 Demand for fuelwood was traditionally met from trees ringbarked for farm development in surrounding NSW. The ACT source was mainly old hardwood logs within pine plantations.

9.5 At this stage the committee has no direct evidence as to the current rate of conversion to and installation of solid fuel heaters and appliances, or about the rate of conversion from solid fuel to other forms of heating. However, anecdotal evidence suggests that sales of these appliances continues at a reasonable rate notwithstanding the steadily increasing cost of hardwood fuelwood relative to other fuels.

9.6 As the availability of suitable hardwood fuelwood in areas of NSW surrounding the ACT diminish, suppliers are being forced to meet the demand from areas of NSW at considerably greater distances from the ACT. The significantly higher costs involved in supplying the ACT from these sources is reflecting in increased prices for fuelwood.

9.7 Again, while having no direct evidence on the matter, the committee accepts that an appreciable number of householders install open fire and potbelly type heating for supplementary, rather than as the principal form of heating, and in many cases for ascetic and "recreational" purposes. The Use of such forms of heating is likely to be concentrated at weekends when people are able to relax and enjoy their fires and also because of the extra effort required in building up fires, cleaning them out and disposing of ash. For these operators, the cost of fuelwood is probably not a major consideration. On the other hand their usage of fuelwood is probably not heavy.

10. Fuelwood Supply – Ecology Implications

10.1 Evidence presented to the committee indicates a growing awareness of the problems of diminishing local fuelwood supplies and the potential adverse environmental effects of meeting demand from rural NSW.

10.2 A major concern is the depletion of native hardwood trees. Not all fuelwood collectors restrict themselves to removing fallen dead timber. Standing dead and live trees are also taken. Apart from the aesthetic appeal of maintaining roadside green belts, trees provide habitats for native birds and animals. The hollows of old eucalypts in particular are nesting homes for native birds.

10.2 The problem is recognised by the Australian Solid Fuel and Heating Association which has supported the recommendations of a study commissioned by the National Energy Research, Development and Demonstration Council on the benefits and environmental costs associated with the fuelwood industry.

10.3 Those recommendations included the use of logging residues rather than dead wood, better integration of fuelwood with saw–log and pulp–log harvesting, and investigation of over–exploitation for fuelwood of certain areas.

10.4 In most NSW municipalities it is an offence to fell live trees. Nevertheless, there is evidence that live trees are being felled to meet the ACT demand. As one person put it to the committee, a green tree can easily be converted to a dead tree by poisoning or ringbarking – a convenient way for an unscrupulous wood supplier to ensure next year's supply. This practice is to be deplored but it is probably almost impossible to prevent.

10.5 The committee has no reason to believe that the majority of fuelwood suppliers do not have a responsible approach to their business and it is regrettable that those who have little appreciation of the damage they do to the ecology by cutting healthy trees can reflect poorly on the industry as a whole. The committee feels sure that responsible cutters would have no objection to making it as difficult as possible for the cutting of healthy trees for the ACT market.

10.6 A possible conclusion is that the Government consider a licensing system for fuelwood suppliers to the ACT which would include a requirement for documenting the source of hardwood fuelwood supplies.

11. Fuelwood Plantations (Hardwoods)

11.1 The ACT Administration has set in train a number of measures to assess fuelwood resources, to educate the community on using alternative fuelwoods and to establish fuelwood plantations.

11.2 All hardwood on ACT government managed land is protected under the Nature Conservation Act. Permits to collect such wood is not available on a regular basis. Dead trees and wood are a vital part of the natural bush ecology. They are the habitat for native animals and birds as well as fungi and insects which are part of the food chain for indigenous fauna.

11.3 In its submission to the committee, the Department of Urban Services said it is not considered ecologically sound to produce fuelwood from existing native forest in the ACT. The feasibility of eucalypt plantations is being tested in a sequence of species trials at Lyneham Ridge and Gungahlin.

11.4 The Department advised that some 3800 hectares are available for hardwood plantations, not including the potential for plantations on leased rural land. Eucalypt growth rates in plantations vary according to species, site preparation and tending as well as the site itself. Best estimates are that over a 20 year period, each hectare would produce an average 12 tonnes per year. On this basis, a net 3500 hectares planted to hardwood would produce 42000 tonnes of fuelwood per year over a 20 year period (harvesting would begin ten years after planting). The estimated cost would be $1500 per hectare per year, excluding fencing, for a total investment of $5.25 million.

11.5 Intensively managed eucalypt plantations have a similar effect on the environment to other intensively managed long term crops. With sound management, the adverse effects would seem to be minimal. Plantation losses would be minimised by using proven species, conditioned to the ACT climate, pests and other adverse local conditions.

11.6 If hardwood fuelwood plantations are to be developed as the committee will recommend, it is important that the community be informed as to the necessity for the plantations, and that general community acceptance of the concept be sought. Steps should be taken to minimise the scope for misunderstanding about the ultimate purpose of the plantations. Public acceptability would therefore require community consultation, and information programs about the role and purpose of hardwood fuelwood plantations. The community should, for example, be made aware that the harvesting of these native forests will bring about changes in the appearance of the landscape.

11.7 Irrespective of public education programs and consultation, hardwood plantations would inevitably attract wildlife which would be adversely affected when the plantation is harvested. Accordingly, the committee sees considerable merit in integrating hardwood plantations with landscape and vegetation strategies for the ACT so as to provide optimum conditions for preserving wildlife and allowing for wildlife movement corridors.

11.8 Some possible conclusions are that:

(a) the Government develop a program of hardwood plantations to meet future ACT fuelwood demand.

(b) the Government examine the feasibility of encouraging the holders of ACT rural leases to develop hardwood fuelwood plantations.

(c) plantations be clearly identified as to their purpose in order to minimise public perception of loss of established woodland when harvesting of the plantation begins.

(d) plantations be integrated with landscape and revegetation strategies.

(e) plantations be designed to provide for wildlife conservation and movement corridors.

12. Fuelwood Plantations (Softwoods)

12.1 As there is no market for small logs within economic transport distance of the ACT, some 20,000 cubic metres of these logs are left on the forest floor each year after harvesting of saleable timber. The use of this material for fuelwood heating is becoming more widespread, but it has not been a favoured fuel mainly because of traditional, but incorrect, beliefs that hardwood is superior.

12.2 For the same weight, dry pine gives as much heat when burned as does hardwood. Dry pine will not clog a chimney any faster than dry hardwood. Most of the air pollution from wood heaters comes from incorrect heater use or from burning wet or green wood.

12.3 Pine fuelwood is available, easy to collect and relatively cheap, and is a good alternative fuel for wood heaters. It is not sold commercially in the ACT except as sawmill offcuts. Permits are issued for gathering fallen pine from plantations.

12.4 The current situation therefore is that ACT demand involves the consumption of substantial amounts of fossil fuel in transporting fuelwood from distant parts of NSW when a significant unused resource in the form of pine fuelwood is available as a substitute and is not being used effectively.

12.5 The turn–out of fuelwood from any prospective ACT hardwood plantations could not be expected to meet much more than half the current demand for fuelwood let alone future demand. In view of this, the logic for significantly increasing the consumption of existing pine fuelwood resources is compelling.

12.6 The committee believes that greater efforts are needed to promote the use of pine fuelwood and in educating ACT consumers about the benefits of using this fuel. Creating a demand for pine fuelwood would provide an economic use for small logs which otherwise rot on the forest floor. It would, of course, also reduce the demand for hardwood fuelwood.

12.7 The committee noted that at least one conservation group considers that existing pine plantations as they are harvested should be replanted with native species. The committee has insufficient considered advice on the issue at this stage, and has not established whether this is an objection to pine plantations in Australia based on ecological or other environmental grounds or whether it is simply a proposal to use the land as it becomes available for hardwood plantations. The committee would, therefore, welcome further comment on this matter.

12.8 Accordingly, the committee does not express any view about the desirability of additional pine plantations in the ACT. However, it observes that there are currently substantial resources of pine fuelwood available in the ACT which are not being economically used and that hardwood resources in NSW are being unnecessarily exploited to meet the ACT's demand for fuelwood.

12.9 A possible conclusion is that the Government as part of the higher profile publicity campaign mentioned as a possible conclusion in paragraph 6.13 of this report, initiate a program of encouraging the greater use of pine fuelwood, the program to include education on the correct use of pine as a fuel.