LEGISLATIVE ASSEMBLY FOR THE AUSTRALIAN CAPITAL TERRITORY

STANDING COMMITTEE ON CONSERVATION, HERITAGE AND ENVIRONMENT

REPORT NO. 4

FUELWOOD HEATING IN THE AUSTRALIAN CAPITAL TERRITORY

SEPTEMBER 1991

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1. Introduction

1.1 On 28 June 1989 the Assembly agreed that the committee inquire into and report on an integrated energy resources and environment policy for the ACT with particular reference to:

(a) the use of emission standards for wood burning stoves integrated with management of plantations of pine and native species;

(b) housing design standards to conserve energy;

(c) the environmental impact of current energy use in the ACT and the environmental impact of alternative proposals for balanced energy use; and

(d) the environmental impact of energy use aspects of urban planning and transportation.

1.2 Work on the broad energy reference began during 1989, the committee taking evidence at a public hearing in October that year. The committee accepted that the nature of the reference was such that the most practical way of addressing the issues would be to focus upon particular aspects of the reference with a view to putting together a series of complementary reports.

1.3 As a first step, the committee in April this year published its discussion paper on fuelwood heating in the ACT, entitled "The Burning Question". In this discussion paper the committee canvassed a number of issues of concern to the community which it had noted in submissions received on the main reference.

1.4 The committee posed various possible solutions to the fuelwood heating problem and invited public comment on the issues and on the possible solutions. Twenty one individuals and organisations responded with written submissions. These are listed in Appendix 1 together with a list of submissions received earlier dealing with fuelwood heating, fuelwood and energy efficient housing. At Appendix 2 is a list of persons interviewed by the committee in relation to the fuelwood discussion paper.

1.5 The committee notes that a considerable amount of research, analysis and other work has been done in Australia and overseas on fuelwood heating. Heater emission pollution problems, control strategies and appliance standards have been addressed in a number of other countries. The University of Tasmania Centre for Environmental Studies (Fuelwood Research Group) has been carrying out testing of woodheaters since 1978, with much of its effort directed at the problem of wood-smoke reduction. Dr John Todd, Co-ordinator of Environmental Studies made a submission to the committee, and we are indebted to him for making the results of the Centre's research available.

1.6 The committee welcomed the public response to the discussion paper and thanks those who responded either by submission or by expressing views orally to committee members and staff.

1.7 It is clear to the committee that the extent of fuelwood heating in the ACT, coupled with poor heater operating practices and local weather conditions leads to significant levels of air pollution which causes physical discomfort for many residents and, in some cases, exacerbates health problems.

1.8 A number of respondents urged strong action against the use of solid fuel heaters, with some pressing for the outright banning of appliances and others for rigorous policing of their use and the imposition of penalties for inefficient usage and where emissions caused air pollution. The committee sympathises with those who suffer physical discomfort and health problems due to woodsmoke to the extent that they advocate such drastic control measures. However, the committee believes that much can be done to alleviate these legitimate concerns and to substantially improve the air quality in Canberra through the winter months by improved heater design, emission controls, and the correct use of heaters.

1.9 The committee's recommendations should, if acted upon, go a long way towards reducing winter air pollution and thereby alleviating the health and other discomforts borne by ACT residents.

1.10 Examination of fuelwood heating led inevitably to the question of energy efficient housing. This subject is part of the broad reference, and the committee received a number of submissions on the matter, several of which drew the committee's attention to the causal link between the need for heating and house design and siting. The committee considered it entirely appropriate and indeed imperative that it address the issue of energy efficient housing in this report if the fuelwood and heating issues were to have any relevancy to Canberra's situation.

1.11 It should be noted that the committee was also required to link its examination of wood burning heaters with the use of pine and native fuelwoods. The committee accepts that there are real concerns in the ACT community about the conservation of indigenous tree species and habitat which are under a degree of threat from fuelwood heater use. It has made certain recommendations in this area which may offend those who believe that wood heating should be discouraged. However, the committee must take a broader view in the community interest. Its recommendations are intended to ensure sustainability of a viable and renewable fuelwood resource for the ACT with minimum danger to the natural environment and the responsible use of fuelwood.

2. Solid Fuel Appliances

2.1 Solid fuel appliances are used in some one million Australian homes, providing more than 20 per cent of the nation's domestic heating energy.[1] There was a marked increase in the use of woodheaters during the 1980's and the trend is continuing. An estimated 4.4 million tonnes of air-dry fuelwood are used each year. Analysis of comparative costs of main residential heating fuel options shows that, based on running costs, fuelwood is very economic in most areas and that it likely to have an important role as a domestic energy source.[2]

2.2 More than 4,000 people are directly employed in the manufacture and distribution of the 80-100,000 solid fuel appliances sold each year. Industry turnover is about $130 million annually. The Australian Solid Fuel and Wood Heating Association embraces manufacturers, distributors, retailers, the service industry and government agencies for the stated purpose of inter alia, research and development in design, performance, installation and safe operation of wood heating appliances. The Association also claims the objectives of developing achievable, effective and environmentally acceptable particulate emission levels to which all heating appliances must conform.[3]

2.3 When used correctly solid fuel heaters are an attractive and 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.

2.4 More generally, fuelwood is one of a number of forms of energy. The amount of heating and hot water generated by fuelwood 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 fuelwood heaters, and it is dealt with in section 6 of this report.

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1 Solid Fuel and Wood Heating Industry to the Year 2000 "Wood is Good", Australian Solid Fuel and Wood Heating Assoc. Inc, Sept 1990.

2 Submission no. 8, p. 5, Fuelwood Use and Supply in Australia, Energy Information Update, Department of Primary Industry and Energy, April 1990.

3 Solid Fuel and Wood Heating Industry to the Year 2000, op cit.

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 particularly in recent years with the growth of Canberra and the attendant greatly increased numbers of motor vehicles and fuelwood heaters.

3.2 Analysis of airborne particulates in Civic and Kambah by the Centre for Resources and Environmental Studies (CRES) at the Australian National University indicates that motor vehicle emissions are a dominant source of Civic airborne particulates and that while these are also important contributors in Kambah, a dominant source of particulates there is from woodheaters and open fireplaces.[4]

3.3 An interim conclusion by CRES was that woodburning was 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. On the basis of its findings, CRES suggested that an urgent need existed to develop a strategy to control emissions from this presently uncontrolled pollution source.[5] The committee concurs with this view.

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 during winter
- smoke odours are an unpleasant characteristic of the Canberra winter, with smoke invading neighbouring houses and penetrating drying washing and curtains

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[4] Submission no. 8, p. 44.

[5] Submission no. 8, p. 44.

3.5 Several submissions pointed out the contradiction in the banning of cigarette smoking in many workplaces and in public buildings and other areas for health reasons while no action was taken to prevent the passive inhalation of emissions from fuelwood heaters.

3.6 This should, of course, be seen in the context of what is happening elsewhere in the ACT and surrounding regions. Autumn in Canberra this year (1991) was characterised by particularly smoky conditions which virtually obliterated the vistas towards the Brindabellas and on a number of occasions blanketed the city with acrid fumes. This was caused by burning off in rural areas as far away as Victoria. It could be reasonably said that for several weeks this smoke was probably far more intrusive in its general effects than has been the case with smoke from fuelwood heaters. While burning off tends to be irregular compared with the predictability of fuelwood emissions in winter, observation suggests a growing predictability in recent years with burning off, a circumstance which causes the committee some concern.

4. Health Effects of Airborne Particulates in Wood Smoke

4.1 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.[6]

4.2 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.[7]

4.3 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.[8]

4.4 The committee noted that the potential health risk of pollutant emissions by fuelwood 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.

4.5 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.

4.6 The committee noted 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

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6 Submission no. 8, p. 21.

7 Submission no. 8, p. 20.

8 Canberra's Environment 1989, State of the Environment in the National Capital and the ACT, NCPA June 1989, p. 6.

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 fuelwood heating emissions are a contributing factor, there is a lack of controls and this has implications for public health.

4.7 The continuing growth in Canberra's population 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.

4.8 In this regard the committee noted 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.[9] The committee considers 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.

Recommendations

4.9 The committee recommends that the Government:

(a) commission a study, with the support of the ACT Pollution Control Authority, into the health aspects of fuelwood heating and other emissions in those areas of Canberra subjected to particular airshed characteristics which appear to concentrate emissions.

(b) maintain continuous monitoring of air quality throughout the ACT, with particular attention to those areas which are prone to high emission levels. The committee would see this as directed to all sources of air pollution, including motor vehicle emissions.

(c) 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, and**
- **reminders on the appropriate methods for fuelwood heater operation.**

(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.

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[9] ibid, pp. 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 fuelwood 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 Industry representatives told the committee that a substantial amount of the fuelwood used in the ACT is green or wet and that there is a problem with such wood being sold cheaper than dried fuelwood sold by merchants. Moisture content can be tested. Burning wet or green wood 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. 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.

5.4 The committee was informed by industry representatives that 85 per cent of fuelwood used in the ACT is hardwood and that Australian manufactured heaters are geared to the use of hardwood.

5.5 Most ACT commercial suppliers present fuelwood as being seasoned and ready to burn. Usually hardwood is felled and left to dry in the paddock, then cut into sections for sale. Some wood is cut and split before sale. It was put to the committee by one respondent that wood for sale should be cut, split and stacked under cover from one to two years if it is to be dry enough to burn, and that standards need to be set in the ACT for wood sold as being ready for immediate use.[10]

Recommendation

5.6 The committee recommends that the Government expand the role of the Consumer Affairs Bureau to enable it to ensure that fuelwood offered for sale to householders in the ACT is sufficiently seasoned to allow for immediate use.

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[10] Submission no. 22.

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.[11]

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.[12]

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.[13]

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

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[11] Submission no. 19 sub section 2.1.3.

[12] Energy Information Centre S.A. 1990.

[13] Submission no. 8, p. 52.

it is difficult to judge whether it has had any appreciable effect on the way people operate their heaters.

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 some householders 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 well-being of the general community.

6.12 It is clear to the committee that the Pollution Control Authority should be empowered to act against complaints. One respondent pointed out that enforcement of pollution controls against domestic fuelwood heaters would be difficult as most of this pollution starts after office hours or on weekends when inspectors are not normally on duty. The committee does not regard this as an insurmountable problem when considerations of public health and amenity are concerned. This respondent also observed that it is sometimes difficult to know when a fuelwood heater starts to emit smoke, and suggested that to help avoid complaints and fines, consideration be given by householders to the fitting of an appropriate smoke detector near the top of the flue.[14]

Recommendations

6.13 The committee recommends that the Government:

(a) develop and fund a high profile publicity campaign, with the support of the ACT Pollution Control Authority, including use of television in Autumn and during the winter months directed at householders reviewing the

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[14] Submission no. 22.

efficiency of their existing fuelwood heaters and counselling correct heater operation.

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

(c) expand the Pollution Control Authority's powers to embrace 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.

(d) pursue with relevant Federal Government agencies including the National Energy Research Development and Demonstration Program the feasibility of developing a smoke detector for alerting householders to excess levels of smoke emissions from fuelwood heaters over an extended period, such a detector to be fitted to all flues in the ACT.

7. Design and Emission Standards For Solid Fuel Appliances

7.1 Design characteristics have a key role in emission levels. Australian and New Zealand heaters are generally in the cleaner burning group and have established a good reputation for their clean burning performance.[15] Until recently there were no design standards to take account of characteristics required for clean burning performance. However, the committee was advised by the industry that it was co-operating with the Standards Association of Australia (SAA) in developing a draft performance test method for heaters, an emission standard and specifications for the construction of appliances.

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 The committee was advised that the industry had spent some $180,000 on its emissions and installer training programs and was seeking funding from the Energy Research and Development Corporation to further develop the testing program. It costs $8–10,000 to test each appliance for each fuel type.[16]

7.4 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 covers inter alia flue installation and heights above roof ridges for the purpose of facilitating air flows and aiding the dispersal of emissions.[17]

7.5 The industry informed the committee that there were differences between the ACT and neighbouring Queanbeyan on permitted flue heights and this could become a problem for those Canberra suburbs closer to Queanbeyan. The committee has formed the view that irrespective of the standard AS2918, it may become necessary in especially problematic locations of the ACT, in terms of topography in particular, to require installation of very low emission heaters.

Recommendations

7.6 The committee recommends that:

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[15] Submission no. 8, p. 63.

[16] Submission no. 21, pp. 7/8.

[17] Standards Association of Australia, AS2918.

(a) a code for the installation of heaters in problematic areas of the ACT be developed.

(b) the Government consult with the NSW Government with a view to adopting an installation standard for fuelwood heaters in Queanbeyan and in shires surrounding the ACT in line with the standard AS2918.

(c) The Government examine the draft standards and specifications being developed by the Standards Association of Australia in co-operation with the industry, and that it seek to have the appropriate standard provide for foolproof operation of heaters in order to minimise the extent of emissions.

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 canvassed for consideration in the discussion paper included 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 The industry supported the concept of change-over and update incentives as a practical step to hasten the cleanup of Canberra's ambient air quality. The industry forecast a product endorsement code as a means of achieving rapid compliance to the general emissions standard.[18] Views from other respondents ranged from support for incentives to support only for low income earners and pensioners to provision only of free advice and inspection.

8.4 A view put to the committee was that existing heaters which did not meet the emission standard be covered (legislatively) by a sunset clause (requiring replacement or upgrading to the standard) five to ten years from the date of installation.[19] The committee sees merit in a requirement for such heaters to meet the standard, but considers it could be a hardship for most people to have to do so without some assistance.

8.5 In the committee's view an over-riding consideration in the matter of incentives is whether the Government and the community are convinced that there is a demonstrated health concern, namely fuelwood heater emissions, and whether this calls for action by the Government to rectify the problem as speedily as possible.

Recommendations

8.6 The committee recommends that the Government:

(a) develop a program for inspecting and testing all fuelwood heaters against the emission standard once it is adopted.

(b) examine the feasibility of encouraging by means such as loans and grants, the replacement of heaters which do not meet the emission standard.

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[18] Submission no. 39, p. 9.

[19] Submission no. 33, p. 1.

9. Fuelwood Demand

9.1 Estimated as the number of ACT homes fitted with solid fuel appliances vary quite widely. However, the then department of Urban Services in 1989 put the number at 20,000 homes with an estimated usage of 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.[20]

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 Fuelwood 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 ring-barked for farm development in surrounding NSW. The ACT source was mainly old fallen hardwood logs from within pine plantations.

9.5 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. The main area of supply by commercial fuelwood dealers is from Condobolin, an approximately 800km round trip from Canberra. At the current rate of demand, the industry claims that Canberra has a 20 year supply from this and other sources within an economic distance.

9.6 The committee believes 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 users the cost of fuelwood is probably not a major consideration. On the other hand their usage of fuelwood is probably not heavy.

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[20] Submission no. 19, sub section 2.1.2.

10. Fuelwood Supply - Ecology Implications

10.1 There was clear evidence in submissions to the committee of a deep concern about the use of hardwood fuelwood, diminishing supplies, the methods used by some to create supplies by ring-barking and taking fallen habitat logs and the potential adverse environmental effects of meeting demand from rural NSW. A particular concern is that standing dead trees are taken. These trees are often of major habitat and territorial significance to arboreal mammals, and in many cases these trees have greater environmental significance than the surrounding living trees.[21]

10.2 A major concern is the depletion of native hardwood trees and the clearing of forests, woodlands road verges and copses associated with fuelwood harvesting. The harvesting of these trees liberates a great deal of carbon dioxide and causes greater immediate and local environmental damage.[22] 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.[23]

10.3 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.

10.4 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.[24]

10.5 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 ring-barking - 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.

10.6 The committee has no reason to believe that the majority of commercial 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

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[21] Submission no. 35, in particular pp. 10/12.

[22] Submission no. 35, p. 9.

[23] Submission no. 21.

[24] Solid Fuel and Wood Heating Industry to the Year 2000, op cit, p. 21.

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.

10.7 One proposal canvassed by the committee in its discussion paper was that fuelwood suppliers to the ACT be licensed and that they be required to document the source of hardwood fuelwood supplies. There was support for this from both the industry during discussions and from various organisations and individuals concerned about conservation and the environment. Other proposals put to the committee included licensing to ensure that suppliers obtain fuelwood in an environmentally acceptable and ecologically sustainable manner coupled with a requirement that all fuelwood sold in the ACT be stamped with the supplier's number[25], on the spot fines for illegal collection of fuelwood[26], and an environment tax on all fuelwood to help reduce the amount of wood consumed.[27]

10.8 In view of support for its licensing proposal, the committee will recommend that this be instituted as a means of ensuring as far as possible that hardwood fuelwood is harvested in an ecologically responsible way. The committee does not favour other means of control as outlined above. The committee does not take the view that the use of fuelwood heating is in any way anti-social or irresponsible. Indeed, the use of such heating is both normal and traditional and ought not to be constrained by excessive regulation. However, the committee does wish to promote the responsible use of fuelwood heating and therefore supports the licensing of suppliers as part of its package of measures outlined in this report to achieve that end.

Recommendation

10.9 The committee recommends that the Government institute a system of registration of persons, organisations, companies and others who supply hardwood fuelwood to the ACT market for sale, with the intention of identifying the source of supply of their product and for providing suppliers with information on regulations governing the industry.

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25 Submission no. 35, p. 18.

26 Submission no. 40, p. 5.

27 Submission no. 38.

11. Fuelwood Plantations (Hardwoods)

11.1 Unlike fossil fuels, wood is a renewable resource. The committee noted expert opinion to the effect that as much as half the current Australian demand for fuelwood could be met from purpose grown supplies. The main benefit of fuelwood use, as far as Australia's contribution to atmospheric carbon dioxide increase is concerned, is the reduced demand for fossil fuels. At present fuelwood use contributes very little to net carbon dioxide release, its contribution being mainly the use of fossil fuels used in the harvesting of fuelwood. If fossil fuels were used to substitute for all fuelwood use in Australia, it would increase national carbon dioxide emissions by about two per cent.[28]

11.2 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.

11.3 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.

11.4 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.

11.5 Investigations into the growing of hardwood for fuelwood in the ACT began in the 1920's with a coppicing trial set up on Black Mountain. With the demand for fuelwood increasing and a resurgence of interest in growing hardwood plantations, a joint ACT Forests/CSIRO trial began in 1984 on three sites on ACT Forest land. Plantings by ACT Forests at North Lyneham Ridge were established in 1985 and plantings at Gunghalin were carried out in 1989 and 1990. ACT Forests advised the committee that the information gained from the 1984 trial have been invaluable in helping them understand what grows best where. It has also placed ACT Forests in a prime role to establish and manage any plantations that the government may wish to establish in the future.[29]

11.6 The Department of Urban Services advised the committee that some 3800 hectares could be available for hardwood plantations from unleased land in the ACT. This area excludes land with significant existing tree cover. It does not include potential plantations on leased rural land. Eucalypt growth rates in

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[28] Firewood: What is it doing to Atmospheric Dioxide? J J Todd paper to 59th ANZAAS Congress, Hobart 1990.

[29] Submission no. 41.

plantations vary according to species, site preparation and tending as well as the site itself. Best estimates are that over a 20 year growing period, each hectare would produce an average 12 tonnes of air dried fuelwood per year. Theoretically a net 3,500 hectares planted as fuelwood would produce 42,000 tonnes of fuelwood per year ten years after planting. However, a program of planting would in all likelihood need to be progressive with, for example, blocks of 150 to 350 hectares being prepared each year. On the basis of cost estimates provided to the committee the development of fuelwood plantations would be commercially viable.[30]

11.7 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 could be minimised by using proven species, conditioned to the ACT climate, pests and other adverse local conditions.

11.8 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.

11.9 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.

Recommendations

11.10 The committee recommends that:

(a) the Government develop a program of hardwood plantations to meet future ACT fuelwood demand, including the feasibility of encouraging the holders of ACT rural leases to develop hardwood fuelwood plantations.

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

(c) hardwood fuelwood plantations be integrated with landscape and re-vegetation strategies.

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[30] Submission no. 19 sub section 2.2.3. & submission no. 41.

(d) hardwood fuelwood 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 15-20,000 tonnes of wood are left on the forest floor each year after harvesting of saleable timber. There is probably about 10,000 tonnes that could be used as fuelwood and its use for fuelwood heating is becoming more widespread. Pine has not however been a favoured fuel mainly because of traditional, but misconceived, beliefs that the use of pine for fuel will clog chimneys and flues.[31]

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 off-cuts. 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. However, the development of pine as fuelwood would require changes in harvesting operations and ACT Forests advised the committee that this could make the enterprise uneconomic unless a significant demand for the product developed. ACT Forests advised that the sale of pine from ACT forests may supplement the sale of hardwood fuelwood. However, it may never have a significant impact on the amount of hardwood used for fuelwood each year.[32]

12.6 The committee noted strong opposition to pine plantations by conservation organisations. The points made are that pines are exotic monocultures with few native plants and with a grossly simplistic structure due to dominance by rows of evenly aged trees. Conservation representatives submitted to the committee that pine forests offer few feeding opportunities and very few breeding substrates for wildlife and that pine needles tend to radically alter the soil microflora and produce substantially different soli ecosystems from those normally indigenous to a eucalypt forest.[33]

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[31] Submission no. 41.

[32] Submission no. 41.

[33] Submission no. 35, p. 14.

12.7 The committee does not advocate the planting of softwood fuelwood plantations. However, it observes that there are currently substantial resources of pine fuelwood available in the ACT which are not being economically used and that there is a potential for this fuelwood to be used to partly in substitute for hardwood resources in NSW which are being exploited to meet the ACT's demand for fuelwood.

Recommendation

12.8 The committee recommends that the Government investigate the feasibility of developing a market for softwood fuelwood based on small logs produced as a side product in the harvesting of ACT pine forests.

13 Energy Efficient Housing

13.1 Fuelwood heating like other forms of heating is used for the obvious purpose of warming houses. If houses can be built in such a way as to retain warmth then the need for fuelwood burning and the use of other heating will be less. The implications of this in terms of reduced smoke emissions, conservation of resources and costs to households as well as the wider community cannot be overstated. The committee therefore sees an inextricable link between the design and the siting of houses and the need for heating and cooling of houses.

13.2 It was put to the committee that most new home buyers, particularly young couples who are comparatively inexperienced about the costs of managing a household, buy their houses off the shelf from builders or developers. They therefore buy what is on offer (and, of course, what they can afford) and may make minor modifications to customise the house to their own taste. These people tend to buy from builders who are not necessarily attuned to energy efficiency in building without an incentive to think about such matters.[34] It is clear to the committee that home-buyers need to be educated to the benefits of demanding energy efficient housing.

13.3 The committee noted that the draft standards for public housing in the ACT prepared in 1987 by the former National Capital Development Commission (NCDC) and the ACT Housing Branch rated thermal comfort and energy conservation important objectives in design and planning aspects of public housing. The objective was to provide optimum thermal comfort with minimum consumption of manufactured energy.[35] The NCDC's Technical Paper 22 entitled "Low Energy House Design For Temperate Climates", 1977 was produced for consultation and use by all home-builders.

13.4 These standards also include provisions relating to house orientation, glazing, thermal mass (building materials), insulation and vapour barriers, and ventilation and weathershielding. However, the question arises at to whether these policies and standards have been sufficiently considered for use by the broader ACT community.[36]

13.5 The committee notes that the debate has been advanced much further since the NCDC paper was produced. The Victorian Government has legislated to make insulation compulsory for new houses and has established a house energy rating scheme to provide house owners and buyers with advice on how their houses can be made more energy efficient. The committee will continue to pursue this matter within the terms of its broad energy reference.

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[34] Submission no. 20.

[35] Submission no. 5, p. 27.

[36] Submission no. 19, sub section 3.1.

13.6 While the committee recognises that it will not always be possible to achieve optimum house siting, it considers that every effort should be made by both the Government planning authorities to ensure as far as possible that housing developments are solar oriented. This requirement should be an imperative with all forms of development whether Government or privately sponsored. There appears to be little reason why most housing blocks should not have the correct solar orientation. The committee was informed that Walter Burley Griffin did this with the sub-division of Forrest.[37] The NCDC Standard provides for the maximum amount of glazing to living areas to face between 15 degrees west of north through north to 30 degrees east of north, with the percentage of glazing not to exceed 30 per cent and the avoidance of west orientated glazing to living or bedroom areas. This issue is more completely addressed at pp. 19-28 of the Australian Model Code for Residential Development.[38]

13.7 The committee notes the efforts being made by Government agencies to promote more energy efficient housing in the ACT, but believes that much more can and should be done to reduce the easy reliance which the ACT community places upon all forms of manufactured heating (and cooling in summer) when it is clear that forethought in the design and construction of houses can overcome the problems of home heating at relatively low cost during the construction stage. For example, the committee understands that the fitting of insulation to all walls during building can be done at only a fraction of the cost of doing this after the house is built. Similarly, double glazing is far less costly to fit during construction than later. In both cases, the benefits to householders in terms of warmer (and cooler in summer) houses and significantly lower heating (and cooling bills) will over a relatively short time repay the additional costs of installing effective insulation at the building stage.

13.8 Important as insulation is, however, other building practices are also vital in achieving energy efficiency in housing. These include the types of materials used for walls, ceilings and flooring, floor plans, the use of solar heating and roof overhang.[39] The committee is concerned that insufficient consideration is given to encouraging these practices in the building of houses in the ACT with the result that home heating remains a significant expense for most people, and the problems of smoke emissions and the harvesting of hardwood fuelwood continue as new suburbs are developed in Canberra.

Recommendations

13.9 The committee recommends that the Government:

(a) in the planning of future ACT housing developments pay particular attention to the topography to ensure that the

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[37] Submission no. 20.

[38] Dept Industry, Technology & Commerce, Australian Model Code for Residential Development, Edition 2, November 1990.

[39] Victorian Energy Planning Program "Energy Forum", July 1989, Vol. 6.

maximum thermal benefit can be obtained by appropriate solar orientation of housing developments.

(b) have particular regard to the thermal benefit in the proposed siting of a house before issuing a building permit.

(c) review the ACT building regulations with a view to incorporating requirements for thermal mass, insulation, glazing, ventilation and weathershielding in order to achieve maximum energy efficiency in ACT housing.

(d) provide funding for, and commission the ACT Housing Industry Association to produce, an informative, easy to read and understandable brochure for intending home buyers which outlines the benefits of energy efficient housing, and the necessary design features and solar orientation for achieving energy efficiency in a Canberra house.

(e) comply immediately with the correct solar orientation when designing and building ACT Housing Trust units and houses.

(f) require that the ACT Housing Trust spot purchase only units and houses which conform to correct solar orientation.

14 Recommendations

14.1 That the Government:

(a) commission a study, with the support of the ACT Pollution Control Authority, into the health aspects of fuelwood heating and other emissions in those areas of Canberra subjected to particular airshed characteristics which appear to concentrate emissions.

(b) maintain continuous monitoring of air quality throughout the ACT, with particular attention to those areas which are prone to high emission levels. The committee would see this as directed to all sources of air pollution, including motor vehicle emissions.

(c) 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, and

. reminders on the appropriate methods for fuelwood heater operation.

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

(paragraph 4.9)

14.2 That the Government expand the role of the Consumer Affairs Bureau to enable it to ensure that fuelwood offered for sale to householders in the ACT is sufficiently seasoned to allow for immediate use.

(paragraph 5.6)

14.3 That the government:

(a) develop and fund a high profile publicity campaign, with the support of the ACT Pollution Control Authority, including use of television in Autumn and during the winter months directed at householders reviewing the efficiency of their existing fuelwood heaters and counselling correct heater operation.

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

(c) expand the Pollution Control Authority's powers to embrace 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.

(d) pursue with relevant Federal Government agencies including the National Energy Research Development and Demonstration Program the feasibility of developing a smoke detector for alerting householders to excess levels of smoke emissions from fuelwood heaters over an extended period, such a detector to be fitted to all flues in the ACT.

(paragraph 6.13)

14.4 That

(a) a code for the installation of heaters in problematic areas of the ACT be developed.

(b) the Government consult with the NSW Government with a view to adopting an installation standard for fuelwood heaters in Queanbeyan and in shires surrounding the ACT in line with the standard AS2918.

(c) the Government examine the draft standards and specifications being developed by the Standards Association of Australia in co-operation with the industry, and that it seek to have the appropriate standard provide for foolproof operation of heaters in order to minimise the extent of emissions.

(paragraph 7.6)

14.5 That the Government

(a) develop a program for inspecting and testing all fuelwood heaters against the standard once it is adopted.

(b) examine the feasibility of encouraging by means such as loans and grants the replacement of heaters which do not meet the emission standard.

(paragraph 8.6)

14.6 That the Government institute a system of registration of persons, organisations, companies and others who supply hardwood fuelwood to the ACT market for sale, with the intention of identifying the source of supply of their product and for providing suppliers with information on regulations governing the industry.

(paragraph 10.9)

14.7 That:

(a) the Government develop a program of hardwood plantations to meet future ACT fuelwood demand, including the feasibilty of encouraging the holders of ACT rural leases to develop hardwood fuelwood plantations.

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

(c) hardwood fuelwood plantations be integrated with landscape and re-egetation strategies.

(d) hardwood fuelwood plantations be designed to provide for wildlife conservation and movement corridors.

(paragraph 11.10)

14.8 That the Government investigate the feasibilty of developing a market for softwood fuelwood based on small logs produced as side product in the harvesting of ACT pine forests.

(paragraph 12.8)

14.9 That the Government:

(a) in the planning of future ACT housing developments pay particular attention to the topography to ensure that the maximum thermal benefit can be obtained by appropriate solar orientation of housing developments.

(b) have particular regard to the thermal benefit in the proposed siting of a house before issuing a building permit.

(c) review the ACT building regulations with a view to incorporating requirements for thermal mass, insulation, glazing, ventilation and weathershielding in order to achieve maximum energy efficiency in ACT housing.

(d) provide funding for, and commission the ACT Housing Industry Association to produce, an informative, easy to read and understandable brochure for intending home buyers which outlines the benefits of energy efficient housing, and the necessary design features and solar orientation for achieving energy efficiency in a Canberra house.

(e) comply immediately with the correct solar orientation when designing and building ACT Housing Trust units and houses.

(f) require that the ACT Housing Trust spot purchase only units and houses which conform to correct solar orientation.

(paragraph 13.9)

APPENDIX 1

LIST OF SUBMISSIONS

1. C Carseldine
2. Society of St Vincent De Paul
3. Standards Australia
4. CSIRO
5. Office of City Management, Infrastructure Division
6. Dyseed Pty Ltd (Trading as Burning Log)
7. A Freeman
8. Dr J Todd
9. Conservation Council of the South-East Region and Canberra Inc.
10. National Capital Planning Authority
11. AGL Canberra Ltd
12. M Williams
13. Australians for an Ecologically Sustainable Population
14. Australian and New Zealand Solar Energy Society
15. K Beattie
16. Energy Alliance
17. ACT Electricity and Water
18. Australian Conservation Foundation
19. ACT Department of Urban Services
20. M and A Hodgkin

SUBMISSIONS RECEIVED ON THE "BURNING QUESTION" DISCUSSION PAPER

21. F Riley
22. J Holland
23. M E Clarke
24. J S O'Hara
25. M Spence
26. A Richards
27. E F Frohlich
28. K Beattie
29. G Clarke
30. S Williams - The Heating Specialists
31. C Carseldine
32. C Lintern
33. S Brooke - Environment Interest Branch, ACT Liberal Party
34. Standards Australia
35. Conservation Council of the South-East Region and Canberra
36. Energy Alliance
37. The Energy Centre
38. Dr C M Sutton
39. Australian Solid Fuel and Woodheating Association Inc.
40. Australian Conservation Foundation-Canberra Branch
41. ACT Forests

APPENDIX 2

LIST OF PERSONS INTERVIEWED ON THE DISCUSSION PAPER

K Wood - Solid Fuel & Woodheating Assn. Inc.

P O'Reilly - heating technician

H Smeltink - Canberra fuelwood merchant

L Cremen - Warmglow

J Walsh - Warmglow

M Bresnik - The Heating Specialists

R Falconer - Conservation Council of the South-East Region & Canberra

K Maxwell - Conservation Council of the South-East Region & Canberra

M Rowland - Energy Alliance