

# **Select Committee on Perth's Air Quality**

## **Smoke Emissions from Homes**

### **Discussion Paper 1**

Presented by

**Mr F. C. Tubby, MLA**

Laid on the Table of the Legislative Assembly

on

11 September 1997

**ORDERED TO BE PRINTED**

## Terms of Reference

The Legislative Assembly of the Parliament of Western Australia appointed on 29 May 1997 a Select Committee to investigate and report on air quality in Perth, with particular reference to the following:

- (1)
  - (a) assess community attitudes and concerns in relation to Perth's air quality;
  - (b) investigate ways in which urban air quality can be improved for current and future generations.
- (2) That the Committee have power to call for persons and papers, to sit on days over which the House stands adjourned, to move from place to place and to report from time to time.
- (3) That the Committee present its final report by 1 April 1998.

### Committee Members

#### Chairman

Mr Fred Tubby, MLA  
(Member for Roleystone)

#### Members

Dr Judy Edwards, MLA  
(Member for Maylands)

Mr Iain MacLean, MLA  
(Member for Wanneroo)

Mr Jim McGinty, MLA  
(Member for Fremantle)

Mr Bernie Masters, MLA  
(Member for Vasse)

### Committee Staff

#### Clerk to the Committee

Mr Victor Moate

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Ms Nici Burgess

#### Research Officer to the Committee

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## **Preamble**

It is the Committee's intention to release a series of five discussion papers in the near future, to be followed by a final report in April 1998.

Discussion papers will be released on the following issues:

- Smoke emissions from homes;
- Smoke emissions from open burning;
- Industrial emissions;
- Vehicle emissions; and
- Integrated transport and urban planning.

Each discussion paper will be structured into two sections:

- Section 1 of each discussion paper will present background information on the status of Perth's air quality and the major contributing pollution sources. The content of this section will remain relatively consistent throughout the series of papers.
- Section 2 of the discussion paper will focus on suggested management strategies specific to that source and problem. The strategies are presented for public comment. They are not recommendations.

## **Section 1**

### **Background**

The Perth metropolitan area faces two distinctly different regional air quality problems - particulate haze and photochemical smog.

Evidence presented to the Committee to date suggests that Perth's air quality is relatively good for most of the year, experiencing only occasional events of particle haze and photochemical smog. These polluting events largely result from local winds that fail to disperse emissions into the environment, thereby accumulating and causing pollution. However, there is a fine balance between these occasional situations and that involving an increasing number of individual pollution events. Evidence suggests that the air pollution problems in Perth will increase unless action is taken now.

Public submissions received by the Committee to 30 June 1997 indicate that the community is acutely aware of this fine balance, and is demanding action from the Government to ensure that Perth's air quality does not deteriorate in the future.

The Committee recognises the need for the development of a long term Air Quality Management Plan for the Perth Metropolitan area, and that any such plan needs to be based on strategies that target the key pollutant sources in an environmentally effective and economically efficient way.

Vehicle emissions, industrial emissions, and biomass burning including domestic wood heaters and open burning are all major contributing factors to reduced air quality in Perth. Each of these three subjects will be addressed in separate discussion papers to be released prior to November 1997.

### **Objective and scope**

This paper outlines strategies designed to reduce smoke emissions from homes, both now and in the future. Smoke emissions from domestic wood heaters are a main contributor to the generation of winter haze in the Perth metropolitan area. To a lesser extent these emissions contribute to the level of air toxics.

The strategies presented are a compilation of those implemented in other cities within Australia and around the world, and include suggestions presented in oral evidence and written submissions to the Committee.

The strategies listed are intended as illustrations of the type of action that is needed to ensure that Perth's air quality does not deteriorate in the future. Whilst the Committee is not suggesting that every strategy needs to be implemented, it is acknowledging the need for action across a variety of areas.

The Committee's initial evaluation of these suggested strategies has been facilitated by the investigative tour to Sydney and Canberra (4 - 9 August 1997), where specific strategies have also been proposed or are in various stages of implementation. The Committee recognises the importance of community consultation, and the evaluation of these strategies will take into account all comment received in response to this paper. Therefore, the Committee is not presenting any recommendations at this stage.

This paper is one in a series to be released by the Committee which will contribute towards the compilation of the Committee's final report and recommendations.

### **Perth's air quality now and into the future**

The Perth metropolitan area faces two distinctly different regional air quality problems: particulate haze and photochemical smog. An additional concern is the community's exposure to air toxics, such as benzene, toluene and 1,3-butadiene, with research having recently shown that the levels currently considered safe may in fact be too high.

## Haze

Haze is caused by very small particles that are not visible to the eye but in the air they collectively cause the scattering of light and thereby reduce visibility. Particles that are ten microns in diameter (PM10 or “inhalable particles”) and particles 2.5 microns in diameter (PM2.5 or “fine particles”) are two measures of the concentration of these particles in the air, according to their size. These particles are small enough to be inhaled and are therefore important from a health aspect.

The Committee acknowledges the extensive amount of scientific research that has been undertaken around the world linking particulate matter, especially fine particles, with a variety of health problems, including premature death, aggravated asthma, acute respiratory symptoms including aggravated coughing, chronic bronchitis and decreased lung function.

The Perth Haze Study<sup>1</sup> found that haze levels are highest in winter and lowest in summer. The most significant contributor to winter and spring haze is smoke particles from domestic wood heaters. Vehicle emissions are the second largest contributor of which diesel vehicles are estimated to cause two-thirds of this emission. Summer haze formation is influenced more by the presence of soil, sea salt and the chemical reaction of other pollutants that may be present in the air at the time.

*[Diagrams available in Hard Copy]*

***Relative contribution of smoke to causing particulate haze during winter months.*** (Source: Gras J L, 1996 A report to Department of Environmental Protection of Western Australia on fine-particle haze in Perth).

In general terms, the number of days per year when haze is experienced in the Perth metropolitan area is expected to increase. Particles from domestic sources, such as home fires and wood heaters, are expected to increase over the short to medium term, mainly as a result of the number of wood heaters installed in the Perth metropolitan area that do not meet Australian Standards designed to reduce emissions.

Particles from motor vehicles are also predicted to rise over the short to medium term, principally because of the growth in diesel vehicle use, with only those diesel engines manufactured from the mid 1990's required to meet the Australian Design Rules lower particulate emissions level.<sup>2</sup> This growth in vehicle use is evidenced by the upward trend in the number of diesel vehicles registered in Western Australia, and in diesel fuel consumption.

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<sup>1</sup> Department of Environmental Protection, 1996, *The Perth Haze Study 1994-1996*

<sup>2</sup> Real, John 1997, *Vehicle Emissions and Air Quality in Australia*, paper presented to the Professional Short Course Road Transport Engine Emissions University of Melbourne, 23-25 July 1997

*[Diagrams available in Hard Copy]*

*Peak haze levels in the Perth metropolitan area due to particulate matter. (Source: Department of Environmental Protection, Western Australia).*

### **Photochemical smog**

Photochemical smog is a pollution cocktail caused by the reaction of nitrogen oxides (NO<sub>x</sub>) and reactive organic compounds (ROCs) in the presence of heat and sunlight. Ozone is a product of this reaction, and the monitoring of ozone concentration at ground level is used as an indicator of photochemical smog.

*[Diagrams available in Hard Copy]*

***Photochemical smog formation in the Perth metropolitan area*** (Source: Airwatch, A Monitoring Program for Schools, Department of Environmental Protection, Western Australia, Main Roads Western Australia).

Since heat and sunlight are essential components to the generation of photochemical smog, it tends to be a summer problem for the Perth metropolitan area. Whilst domestic wood heaters emit a quantity of both NO<sub>x</sub> and ROCs, the fact that wood heaters are generally not used during the summer months eliminates them from being a major contributing factor to the creation of photochemical smog.



***[Diagrams available in Hard Copy]***

*(Source: The Perth Photochemical Smog Study, Perth Western Australia, Department of Environmental Protection, Western Australia and Western Power).*

The Perth Photochemical Smog Study<sup>3</sup> found smog events in Perth to be closely linked to the weather pattern. The highest smog concentrations occurred on those days during spring through summer and into autumn when a weak low pressure trough was situated very close to the coast and subsequently crossed the coast in the afternoon (morning easterly winds, afternoon sea breeze).

***[Diagrams available in Hard Copy]***

***Number of days in the month when peak 1-hour ozone concentration exceeded 80 ppb somewhere in the Perth metropolitan area.*** *(Source: Department of Environmental Protection, Western Australia, and Main Roads Western Australia).*

Over the past four years, the Perth metropolitan area has experienced on average 10 days per year when photochemical smog levels were unacceptable from a health perspective. These events, except when associated with bushfire smoke, tend to be of short duration (around two hours) and are not necessarily experienced across the entire metropolitan area.

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<sup>3</sup> Western Power Corporation & Department of Environmental Protection, 1996, *The Perth Photochemical Smog Study*, Perth, Western Australia

## **Air toxics**

The United States Environmental Protection Agency has identified one hundred and eighty nine air toxic substances. This list includes benzene, 1,3 butadiene and polycyclic aromatic hydrocarbons (PAHs). These come from a wide variety of sources, but, in the Perth metropolitan area, the greatest source is vehicle emissions, unless one is a smoker or is regularly exposed to passive smoking.

Each air toxic has a different level at which it will pose a health risk to people. Recent research highlights the need for concern about the effects of long term low level exposure, particularly as some air toxics attach themselves to fine particles (those present as haze) which can be taken in by our bodies. Wood smoke has a toxic component which contains traces of a number of air toxics including carcinogens, such as PAH which adsorb onto particles in the air.

There is no regular monitoring of air toxics in the Perth metropolitan area.

## Section 2

### Community perception and opinion of Perth's air quality and smoke emissions from homes

Submissions received to date have come from individuals, community groups and associations, businesses, industry, academics, health professionals, and Government agencies. A complete list of submitters will be provided in the Committee's final report.

The general perception presented in the submissions is that:

- Perth's air quality is relatively good on most days;
  - but it is getting worse, and
  - it is causing health problems.
- the key pollution sources in the Perth metropolitan area are considered to be;
  - motor vehicles, especially those with smokey exhausts,
  - backyard burning of waste,
  - smoke from home wood fires and heaters,
  - industrial emissions close to the city, and
  - smoke from bush fires and controlled burns of bush land, development sites and agricultural land.

Smoke emissions from homes arise primarily from the use of a wood heater and the burning of backyard waste. Both activities were identified in public submissions as being a major problem. The nuisance factor of backyard BBQ smoke was noted in one submission.

Smoke emissions from homes not only contribute to the creation of particulate haze, but they can also cause a nuisance to neighbours. This was highlighted in some submissions, which emphasise that not only is the smoke a problem, but also the smell associated with the burning activity. Further concern was expressed at the inadequacy of the mechanisms currently in place to address, manage and resolve complaints associated with smoke emissions from homes.

Results from the pre-campaign telephone survey for the *Perth Woodsmoke Campaign*<sup>4</sup> indicate that users of wood heaters are not necessarily operating the equipment efficiently or effectively with 60% regularly damping down their unit, usually overnight. Whilst 65% of the users have been aware of wood smoke in their neighbourhood, 60% were not concerned about their wood smoke drifting to their neighbours' properties.

An underlying theme from the community submissions was that no individual has the right to pollute the air everyone has to breathe. There is also a general perception that, whilst there are technical fixes to improve Perth's air quality, the community is not convinced that the Government is committed to fixing the problem.

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<sup>4</sup> Attwater CR & VJ Thorp, 1997 *Perth Woodsmoke Campaign Evaluation Pre-campaign survey*, unpublished

## Strategies to improve Perth's air quality by reducing smoke emissions from homes

There are a number of strategies that could be introduced to reduce smoke emissions from homes. Those listed here are a range of actions that could be implemented to ensure that Perth's air quality does not deteriorate in the future. The Committee is not suggesting that every strategy as listed here needs to be implemented. Instead, it is seeking your comment on what you consider to be the most effective measures and those which you consider should be implemented for the Perth metropolitan area.

The strategy options have been classified as either *educational*, *technical*, *regulatory* or *market based* where:

- *educational* strategies aim to improve the actions of individual people which may be leading to the creation of smoke;
- *technical* strategies involve making changes to existing technology and implementing technologies;
- *regulatory* strategies are those which require some form of legal enforcement such as local council By-Laws or state regulations or legislation; and
- *market based* strategies which are direct financial incentives or disincentives.

### *Educational Strategies*

1. Implement an education campaign for the community, including brochures, to inform the public on how to use their heaters correctly. This information needs to focus on what to burn, how to burn, how to store wood correctly.
2. Develop or improve guidelines and procedures for the correct use and maintenance of wood combustion heaters. Councils to provide buyers of homes with wood combustion heater user guidelines for the correct use and maintenance of the wood combustion heater.
3. Implement an education campaign aimed at sellers and installers of wood heaters, focussing on flue height design and positioning, and the advantages of units complying with Australian Design Standards.
4. Develop or improve wood selling, wood purchasing and wood storage guidelines.
5. Implement education programs about haze creation and prevention, similar to the Waterwise campaign. Particular emphasis should be placed on school based programs.
6. Develop guidelines for the correct use of backyard BBQ's.
7. Implement voluntary "no burning" days and nights when the weather forecast suggests conditions are likely to produce haze, such as the "Don't light tonight" campaign operating in Sydney.
8. Implement a major education campaign focussing on energy efficient design for buildings, including houses. Target audience would need to include builders, architects and education system.

### *Technical Strategies*

9. Provide green waste collection and mulching services as an alternative to burning waste in the backyard.
10. Improve wood heater design to achieve optimum burning environment and to reduce pollutant generation potential.
11. Provide the technical support, including data on Australian Design Standards and best design and installation parameters, to sellers and installers of wood heaters.
12. Ensure that sellers have access to the newest and cleanest wood heaters.



13. Encourage the use of suitable fuel substitutes, such as the use of compressed fuel logs as sold at Bunnings.

#### *Regulatory Strategies*

14. Ban the selling and installation of new wood combustion heaters (phase in by winter 1998, or within three years).
15. Phase out the use of all wood combustion heaters by banning their use by winter 1998, or within three years.
16. Require home owners to replace wood combustion heaters with an alternative and cleaner heating device before selling the property.
17. Control the times when wood combustion heaters can be used, such as allowing use during the months from May to August during the hours of 6pm to 11pm, and banning the use outside of these times.
18. Restrict the use of wood combustion heaters during periods of decreasing air quality.
19. Provide a mechanism for the reporting of smokey wood heater chimneys, similar to the current Smokey Vehicle Program run by the Department of Environmental Protection.
20. Improve mechanisms for the resolution of local air problems caused by wood smoke from homes, such as penalties to those who operate wood heaters in a polluting way.
21. Increase inspection capabilities for authorities (such as the Department of Environmental Protection and local council officers) to investigate events of pollution coming from homes with wood heaters.
22. Introduce standard council By-Laws controlling the installation of wood heaters and chimneys.
23. Introduce standard council By-Laws requiring energy efficiency in building design.
24. Introduce standard council By-Laws requiring the use of renewable energy sources for heating purposes.
25. Ban backyard burning of waste.
26. Require all new wood heaters sold to conform to Australian Design Standards.
27. Prevent the sale of wood with unacceptably high moisture content.
28. Require wood to be stored under cover and protected from any water or moisture source.
29. Ban the burning of all materials other than dry wood and appropriate kindling.
30. Ban the removal of firewood from the forest estate from June to October.

#### *Market Based Strategies*

31. Place a surcharge on the rates of those houses with wood combustion heaters. The surcharge collected could be used to fund an environmental education program.
32. Offer an incentive scheme to encourage residents to convert from wood heaters to alternatives, such as gas, oil, or solar heating sources.
33. Offer incentives or rewards for those who meet all recommended burning practices and where no smoke problem is generated.
34. Provide planning concessions for buildings incorporating energy efficient design and therefore not needing wood heating at all or requiring less use of wood heating.

## Criteria for assessing strategies

The Committee will assess the strategies outlined in this paper by giving consideration to the eight measures outlined below.

### Measure 1: Emission reduction potential

- What is the unit reduction in pollution per year, per capita?
- What total emission reduction is possible?

### Measure 2: Timing of effectiveness

- What time frame is needed for the strategy to have an effect?
- How long will it take to fully implement the strategy?

### Measure 3: Equity

- Are there individuals or groups within the community who will be disadvantaged by the strategy?
- Is the original source of pollution being targeted?
- Will the polluter pay?

### Measure 4: Technical feasibility

- Is the technology currently available?
- Are there administrative or public perception barriers to the introduction of the strategy?
- Is there a high likelihood of new technology being developed in the future to solve the problem?

### Measure 5: Enforceability

- Are regulatory mechanisms in place to support the strategy?
- Is there a need to enhance the mechanism?
- Is there a need to create a new mechanism?
- Is the mechanism enforceable?

### Measure 6: Cost effectiveness

- What is the cost to the individual?
- What is the cost to the community?
- What is the cost to industry?
- What is the cost to Government?

### Measure 7: Public acceptance

- What is the community's opinion of the strategy?

### Measure 8: Additional social, economic or environmental impacts and benefits

- Does the strategy support any other federal, state or local Government strategy (eg Greenhouse Strategy)?

## **How to have your say**

This paper is one in a series of five to be released which will contribute towards the Committee's final report and recommendations. These papers are being developed to not only bring information to the community, but for the community to bring information to the Committee.

To have your say on the strategies presented in this paper, written comments can be sent to:

Select Committee on Perth's Air Quality  
Legislative Assembly  
Parliament House  
Perth, Western Australia, 6000

*Telephone:* (08) 9222 7381

*Facsimile:* (08) 9222 7803

Submission period closes 30 November 1997.