



Wood Heater Compliance Requirements

Why does the WA Government develop wood heater standards?

The first Australian wood heater emission standards were introduced in 1992, and were revised in 1999.¹

Introducing tighter emission and efficiency standards for wood heaters leads to a decrease in air pollution emissions, reduced wood consumption and creates health benefits.¹

PM₁₀ emissions from wood heaters are associated with health impacts including respiratory and cardiovascular problems, especially in children and the elderly.¹



Purpose

Wood heaters are one of the main sources of air pollution in urban centres of Western Australia (WA), especially during cold months of the year. Wood heaters contribute to the formation of the brown “winter haze” that occurs in Perth, along with other sources (e.g. vehicles, bush fires). Wood heaters produce air pollution that can be harmful to human health and impact on the surrounding environment and its aesthetics.

The *Environmental Protection (Domestic Solid Fuel Burning Appliances and Firewood Supply) Regulations 1998* specify that all new and used wood heaters for sale in WA must comply with current Australian and New Zealand emissions and operating efficiency standards.

The Department of Environment and Conservation (DEC) is responsible for managing and protecting the State’s air quality, with assistance and co-operation from other levels of government, industry and the public. Air Quality Information Sheets (AQIS) offer the Department’s current views on key air pollution issues and guidance on acceptable practices used to protect WA’s air quality.

This AQIS has been developed by DEC to provide information to:

- individuals that are purchasing or selling a wood heater in Western Australia; and
- the community on wood heater standards.



Scope

The information in this AQIS will be of particular use to individuals in WA who wish to purchase or sell a wood heater. The information will also be of interest to people seeking general information on key sources and potential impacts of air pollution in WA. A glossary is included at the back of the document to define key air pollution terms used in this AQIS.

New wood heaters burn more efficiently and produce less air pollution emissions than old wood heaters, pot belly stoves and open fires.²

In 2002, the city of Launceston had the highest per capita population use of wood heaters, followed by Canberra.¹

Approximately 30,000 wood heaters are sold each year in Australia.¹

85% of new wood heaters sold in Australia are made in Australia, with the remainder being imported from overseas.¹

In 2004 the average age of wood heaters in the Perth Metropolitan region was 15.5 years.³

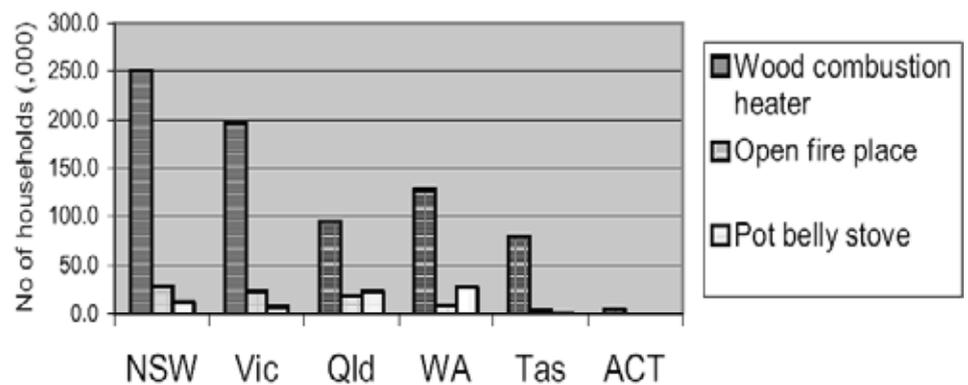
Slow combustion wood heaters have an energy efficiency of approximately 65-75%. An open fireplace has an energy efficiency of 10-15%.⁴

Open fireplaces have low energy efficiency due to the excessive volume of air drawn into the fire and up the chimney during combustion.

What air pollution is produced by wood heaters?

Within wood heaters, the incomplete combustion of wood leads to the production of air pollution in the form of smoke. Wood smoke can contain the following air pollutants:

- Particulate Matter (PM₁₀ and PM_{2.5} - particulate matter with an equivalent aerodynamic diameter of 10 micrometres (microns) or 2.5 microns respectively);
- Volatile Organic Compounds (VOCs);
- Carbon monoxide (CO);
- Nitrogen oxides (NOx); and
- Other air toxics (e.g. acetaldehyde, acetone, benzene, formaldehyde, polycyclic aromatic hydrocarbons).



Types of wood heaters in Australian jurisdictions¹

In 2002, the State with the greatest number of households using wood combustion heaters was New South Wales (NSW). In WA, we still have a large number of households utilising wood heaters (approximately 125,000) and pot belly stoves. The number of households using wood heating in Australian homes decreased by 0.7 per cent between 1999 and 2002.¹

What are the impacts of air pollution from wood heaters?

Health: Wood smoke air pollution can cause numerous health problems (and aggravate chronic conditions in people with respiratory and cardiovascular illness e.g. asthma, lung disease, cancer). For example, PM_{2.5} being inhaled deep into the lungs can have negative health impacts including respiratory and heart disease.

Vegetation and Crops: Air pollution can restrict processes enabling vegetation and crops to grow (e.g. photosynthesis) and contribute to the premature death of vegetation. Wood heater emissions are not currently managed by the government for vegetation impacts.

Visibility: Particles in wood smoke can create a smoke haze and limit visibility.

Odour: The odour created from wood heaters signifies the presence of wood smoke which can adversely affect your health.

Wood heaters can be a greenhouse neutral form of heating. Consuming 1kWh of wood emits 0.34 kg of carbon dioxide. If the wood is sustainably regrown the new tree will absorb this amount of carbon dioxide making the wood a greenhouse neutral fuel (besides the transport emissions).⁴



Wood heaters that are compliant with the AS/NZS 4013: 1999 standard are certified to produce less air pollution emissions than non-compliant wood heaters and open fires.

The maximum emission limits for particles from wood heaters under AS/NZS 4013: 1999 per kilogram of firewood burnt:

- 1) Catalytic combustor fitted is 2.25 g/kg**
- 2) No catalytic combustor fitted is 4.0 g/kg.**

Wood heaters are to be tested for emissions in accordance with AS/NZS 4013: 1999 at a laboratory that is certified by the National Association of Testing Authorities.

How is the Government managing the sale of wood heaters in WA?

Current laws in WA related to wood heater emissions include the *Environmental Protection (Domestic Solid Fuel Burning Appliances and Firewood Supply) Regulations 1998*. This law outlines emission standards for wood heaters by referencing the appropriate Australian and New Zealand standard (AS/NZS4013:1999) and regulates the moisture content of wood sold as firewood.

Standards Australia developed wood heater emission and efficiency standards in 1992. In 1999 these standards were revised, and specify the current test methods for measuring wood heater emissions (AS/NZS4013:1999). Other Australian standards outline the types of fuel to be used in testing wood heater standards (AS/NZS4014:1999) and methods for testing the efficiency of wood heaters (AS/NZS4012:1999).

All new and second hand wood heaters for sale in WA must comply with current Australian and New Zealand standards. Clause 1B(1) of the *Environmental Protection (Domestic Solid Fuel Burning Appliances and Firewood Supply) Regulations 1998* states:

A person must not sell a heating appliance unless the appliance –

- a) complies with the emission standard (as specified in AS/NZS 4013:1999) and
- b) is marked –
 - i) in accordance with section 10 of AS/NZS 4013: and
 - ii) with the name and address of the person or body that tested that model of appliance for the purposes of AS/NZS 4013, and the year in which it was tested.

It is illegal to sell non-compliant wood heaters in WA as a commercial retailer or as a private vendor. Contravening the law is an offence with a penalty of \$5000.

The Perth Air Quality Management Plan was released in 2000, and outlines 12 initiatives to protect air quality in the Perth region. Initiative 9 is Haze Reduction, which includes several programs for the urban area aimed at decreasing haze occurrence. Programs include education campaigns of wood heater impacts, haze alerts and wood heater rebate programs. In recent years, the State Government has offered financial rebates to the public to assist with the replacement of wood heaters which could not legally be sold (see below picture).



Wood heaters collected during the DEC Wood Heater Replacement Program 2006

If your current wood heater does not comply with AS/NZS 4013: 1999, please consider upgrading to a new wood heater.²

Some wood heaters are exempt from the Regulations including central heaters, cookers and water heaters.

It is illegal under Regulation 1C to make false markings on a wood heater in a manner which states or implies the wood heater complies with the emission standard, when they are aware it does not.

An inspector may inspect any heating appliance for sale in Western Australia to check for compliance with Regulation 1B (1) (b).

A heating appliance will comply with the emission standard if an appliance of the same make and model when tested to AS/NZS 4013 has complied with the standard.

A list of compliant wood heater models is available at the Australian home Heating Association (AHHA) website: www.homeheat.com.au

Recommendations: Are you buying or selling a compliant wood heater?

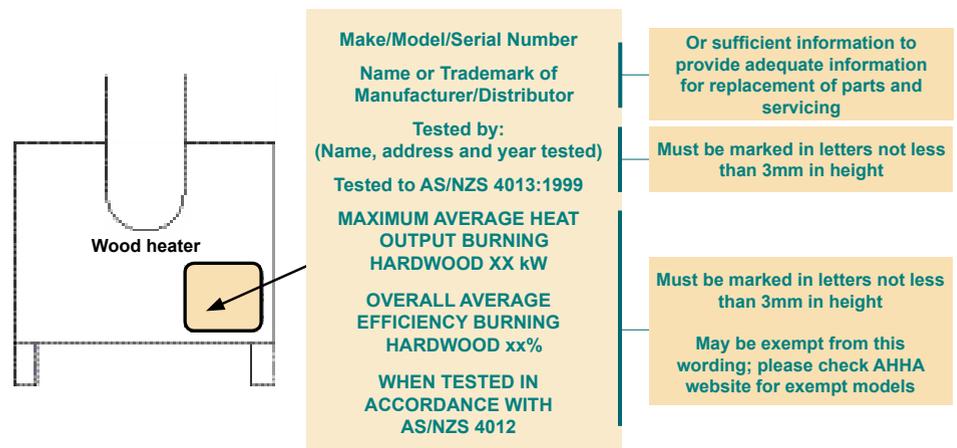
Before buying or selling a wood heater, it is important to confirm the unit is compliant.

A compliant wood heater will have the following details or words on the back of the unit in a permanent manner (with XX representing a numerical figure):

- Make, model
- Serial number of the appliance
- Emissions report number or sufficient information to provide adequate identification for replacement parts, traceability of testing and necessary servicing.
- Catalytic combustor information (e.g. type model, serial number) if used
- Name and address of the testing body and year tested
- The words: "tested to AS/NZS 4013:1999"
- The words: "Maximum average heat output burning hardwood XXkW" *
- The words: "Overall average efficiency burning hardwood XX%" *
- Name or trademark of Manufacturer/Distributor

(*When tested in accordance with AS/NZS 4012. Letters not less than 3 mm in height. Where the wood heater is designed for softwood combustion, the word "hardwood" will be replaced by "softwood" on the back plate).

The words "Burn Only Hardwood" (or softwood) must be visible when opening the wood heater door and must be in letters not less than 3mm in height.



A diagram illustrating the required information that is to be displayed on a wood heater compliance plate.

More information?

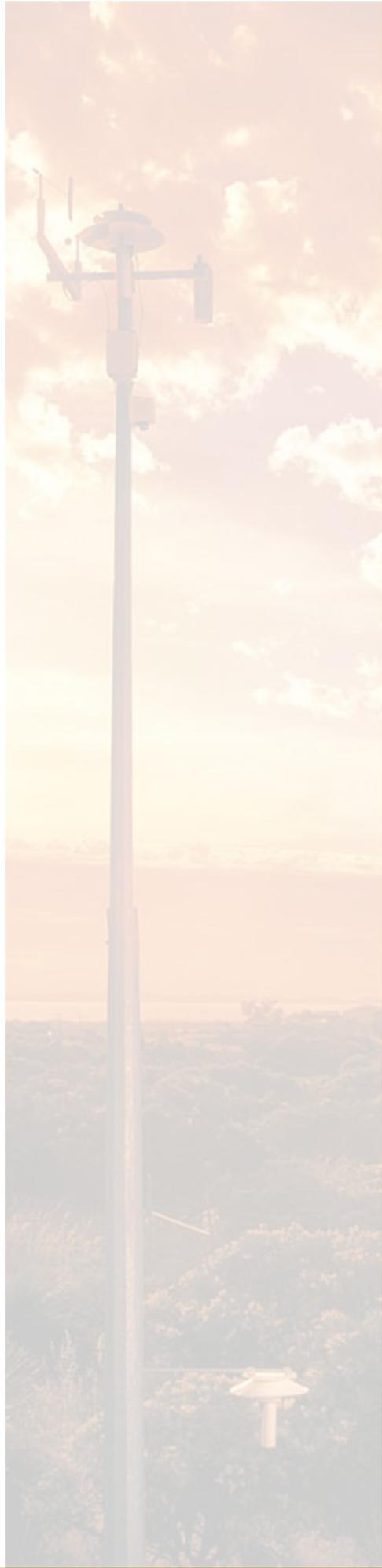
For further information related to this topic please read the following publications on the DEC website at <http://www.dec.wa.gov.au>:

- Wood Heater Policy Options Paper
- Brochure on Wood Smoke – Halt the Haze
- Perth Home Heating Survey 2004 Technical Report.
- A Guide to Buying and Selling Wood Heaters in Western Australia.

A copy of the Australian and New Zealand Standard (AS/NZS 4013:1999) is available from Standards Australia. The *Environmental Protection (Domestic Solid Fuel Burning Appliances and Firewood Supply) Regulations 1998* is available to view online at the State Law Publishers website <http://www.slp.wa.gov.au>

With the further development of Air Quality Information Sheets, additional information on air pollution issues affecting Perth and WA will be published on the DEC website.

To comment on this AQIS or for more information, please contact DEC's Air Quality Management Branch at our Perth offices on (08) 9333 7436 or email airquality@dec.wa.gov.au citing the AQIS topic and version. For specific information on wood heaters and their standards, please contact the DEC at haze@dec.wa.gov.au.



The AQIS recommendations do not override any statutory obligation or Government policy statement on air pollution control. Alternative practical environmental solutions to suit local conditions may be considered. Also this AQIS shall not be used as this Department's policy position on a specific matter, unless confirmed in writing.

REFERENCE

1. Department of Environment and Heritage (DEH). 2006. Wood heater Particle Emissions and Operating Efficiency Standards: Cost Benefit Analysis. <http://www.environment.gov.au/atmosphere/airquality/publications/woodheater-particle-emissions.html> (accessed 15 December 2008)
2. Department of Environment and Climate Change (DECC). 2008. Check your heater complies with the standard. <http://www.environment.nsw.gov.au/woodsmoke/heatercomplies.htm> (accessed 15 December 2008)
3. Department of Environment (DoE). 2006. Perth Home Heating Survey 2004: Technical Report. Perth: Department of Environment.
4. Sustainable Energy Development Office (SEDO). Energy Smart Homes. http://www.sedo.energy.wa.gov.au/pages/energy_smart_homes.asp (accessed 15 December 2008)
5. Environment Protection Authority Victoria (EPA Victoria). 2004. Policy Impact Assessment: Waste Management Policy (Solid Fuel Heating): Managing Solid Fuel Heating in Victoria. Victoria: EPA Victoria
6. Department of the Environment and Water Resources (DEWR). 2007. Substance fact sheets. <http://www.npi.gov.au/database/substance-info/profiles/index.html> (accessed 21st January 2009).

GLOSSARY

Acetaldehyde

A clear, strong smelling organic liquid or vapour, that can cause numerous health impacts with exposure including irritation of the skin, eyes and respiratory system, headaches and dizziness. In severe cases exposure can lead to liver or kidney damage and death. Common sources of acetaldehyde include manufacturing of industry organic chemicals, rubber, plastics, fuels, chemicals and pesticides. Motor vehicle emissions and petrol stations are additional sources of this air pollutant.⁶

Acetone

Acetone is a colourless strong smelling liquid or gas that is highly flammable. Health impacts associated with high level acetone exposure include irritation of the eyes, respiratory system, headaches, nausea and vomiting. Severe health impacts of acetone exposure include kidney, liver or nerve damage. Sources of acetone include paints, varnishes, manufacturing of chemicals, plastics, lime, paper and motor vehicles. Motor vehicles and aeroplanes are also a source of acetone.⁶

Air Pollution

Degradation of the air quality by the presence of natural and foreign substances present in the atmosphere, which can have adverse impacts on human health, vegetation, livestock, agriculture, materials and aesthetics (e.g. visibility).

Air toxics

Air toxics represent a large number of air pollutants that are present in the ambient air and have characteristics that are hazardous to human health and the environment. Air toxics include benzene, 1,3 butadiene, polycyclic aromatic hydrocarbons, heavy metals, volatile and semi-volatile organic compounds and persistent organic pollutants. Air toxics are produced by motor vehicles, industry emissions, paints and adhesives,



cigarette smoke and burning of fuel including the incomplete combustion of wood. Exposure to air toxics can produce increased eye, nose and throat irritation. Air toxic exposure is also linked to increased occurrences of cancer, and respiratory and nervous system damage.

Benzene

Benzene is a clear to light yellow coloured liquid, with an aromatic odour. It evaporates in the air easily, and is a hazardous air pollutant. Benzene can be produced during industry manufacture (e.g. plastics, pesticides) and is also used as a solvent. Benzene is also found in motor vehicle fuels. Health impacts associated with benzene exposure include skin and eye irritations, headaches and vomiting. Benzene is also carcinogenic and long term exposure can lead to the development of cancers such as leukemia.⁶

Carbon dioxide (CO₂)

A colourless, odourless gas that occurs naturally in the atmosphere, and primarily produced by fuel combustion. Carbon dioxide is the most important principal greenhouse gas, with emissions a factor contributing to climate change.

Carbon monoxide (CO)

Carbon monoxide is a colourless, odourless, highly toxic gas, which is readily taken up by the blood and interferes with oxygen absorption. It is one of the most common and widely distributed air pollutants. It is commonly produced by motor vehicles, industrial emissions, cigarettes and area sources (homes, gardens, office blocks and services stations). Relatively small quantities of carbon monoxide can impair bodily functions with prolonged and acute exposure being fatal.

Formaldehyde

Formaldehyde in its pure form is a gas with a pungent odour. Exposure to formaldehyde can lead to allergic conditions impacting on the skin and lungs, and other health impacts including shortened life expectancy and reproductive problems. Within indoor environments, sources of formaldehyde include building materials, fabrics, cigarettes and gas combustion.⁶

Haze

The term used to describe the presence of very small airborne particles in concentrations large enough to affect visibility. Sources of haze include smoke, vehicle emissions, secondary production, dust, sea-salt particles and organic acids. Smoke can originate from domestic sources including wood heaters, fireplaces and backyard burning. Health studies have shown that increased levels of particles and smoke in the air are associated with increased reports of illness, hospitalisation and death.

National Environment Protection Measures (NEPM)

National Environment Protection Measures are statutory instruments defined in the National Environment Protection Council (NEPC) legislation. They outline agreed national objectives for protecting or managing aspects of the environment. The NEPMs in place that are relevant to air quality are:

- Ambient Air Quality
- Diesel Vehicle Emissions
- National Pollutant Inventory
- Air Toxics

Implementation reports and more information on the NEPMs are available at the Environment Protection and Heritage Council website at www.ephc.gov.au.



Nitrogen oxides (NO_x)

Oxides of nitrogen are gases that can undergo chemical reactions to produce photochemical smog. Most common are nitric oxide (colourless, odourless gas) and nitrogen dioxide (orange-brown gas with a stinging smell). They are produced by the combustion of fossil fuels, motor vehicles, gas appliances and industry. Low levels of NO_x can irritate and damage the eyes, nose, throat and lungs.

Ozone

A reactive toxic chemical gas that is produced by a photochemical process between the sun and ozone precursors (e.g. hydrocarbons and oxides of nitrogen). Ozone exists in the upper atmosphere ozone layer (stratospheric ozone) as well as at the Earth's surface in the troposphere (ozone). Ozone in the troposphere causes negative health and environmental impacts, and is a cause of photochemical smog.

Particulate matter (PM)

Particulate matter is a mix of solid and liquid particles suspended in the air. Particles are produced by wood heaters, fires and diesel vehicles. Particles less than 10 microns (one seventh the width of a human hair) can lodge in respiratory tracts and lungs and have been linked to asthma, respiratory disease, cardiovascular disease and premature death. Particles with a diameter of 2.5 microns or less are small enough to penetrate deep into our lungs, causing irritation and structural damage.

Polycyclic aromatic hydrocarbons (PAHs)

PAHs are a group of more than 100 organic compounds. They are colourless, whitish to greenish solids that often attach to particulate matter. They are usually produced by combustion processes including motor vehicles, wood heaters, industrial emissions, agricultural burning and also natural sources (volcanoes and fire). They can cause health effects ranging from eye, nose and throat irritation to organ damage and may even cause death.

Volatile organic compounds (VOCs)

VOCs cover a wide range of gaseous organic compounds and include hydrocarbons, oxygenates and halocarbons. Carbonyls are a reactive subset of VOCs. They include the aldehydes such as formaldehyde and acetaldehyde and the ketones such as acetone and methylethylketone. VOCs are found in carpets, particle-board, cigarette smoke, wood smoke, paper products, pesticides, cleaning agents, glues, paints, solvents and some industry emissions. Their main environmental significance is their role in photochemical smog formation. They can also cause health effects ranging from eye, nose and throat irritation to liver and kidney damage.