

# SMOKE = MONEY UP THE CHIMNEY



THE FIREWOOD ASSOCIATION  
OF AUSTRALIA INC.

## Social responsibility!

There is nothing like the pleasure of a wood fire on a cold night. However, just like driving a car, operating a wood heater requires not only a certain amount of skill but also an obligation to be socially responsible. Prolonged exposure to wood smoke is not only unpleasant but is known to have negative health effects. When you operate your wood heater you need to be considerate of your immediate neighbours and also understand that under certain weather conditions, wood smoke can travel long distances and settle into low lying areas.

## What causes smoke?

When wood burns it does so from the outside to the middle in various stages according to temperature. In the first stage (up to 200°C) some gases are emitted and the wood chars but solid wood does not ignite. In the second stage (200° – 280°C) these gases mix with oxygen and will ignite, provided that there is sufficient external heat. In the third stage (280°-500°C) flaming self-sustained combustion occurs outside the wood where the emerging gases and tars are able to mix with sufficient oxygen. One half to two thirds of the heat of combustion of wood is liberated in this stage by the flaming gases. In this stage of combustion the gases coming from the heated wood effectively cover the wood surface and exclude oxygen, which prevents the charcoal underneath from burning. When the emission of these gases eases, oxygen is able to reach the surface of the wood and the charcoal ignites. This is the final stage, above 500°C the charcoal glows red and at 1000°C it burns freely but with little visible flame.

As you can see from this explanation of wood combustion, oxygen is an essential ingredient in the combustion process, as is heat. If there is insufficient heat or oxygen then combustion of the emitted gases will be incomplete. When unburnt gases and tars condense they form creosote and fine particles which we see as smoke. Because as much as two thirds of the available heat in wood is released as flammable gases, any unburnt gas going up the chimney as smoke is not just an unpleasant problem for you and your neighbours. It also wastes the time, effort and money you have put into heating your home.

Another cause of smoke is wet wood. If the wood you are burning is not sufficiently seasoned or is excessively wet by rain it will contain a lot of water which cools the fire as it boils out as steam. This prevents the fire from reaching stage three temperatures where the gases are fully burnt, causing them to condense as smoke.

## How do we stop smoke?

Avoiding excessive smoke is not hard, provided that your wood is dry. The main way to stop smoke is to ensure that there is adequate air flow into the fire during the early stages of combustion when gas release is at its maximum. This means that you need small pieces of wood as kindling so that the surface area of the pieces is high compared with their total mass. As the fire gets hotter you can increase the size of the wood you add. Once the wood has reached final stage temperatures there is little gas released and therefore not much smoke, so large pieces that will burn more slowly and emit heat over a longer time should be used.

In summary when you light a fire or add more wood to an existing fire you need to:

- Get as much air (oxygen) into the fire as quickly as possible.
- Progressively increase the size of the firewood.
- Arrange the wood so that plenty of air can get to all sides.
- Only reduce the air intake and close the fire down when it has a good bed of glowing red coals.

Some people think that by closing the air vent straight after adding wood they will save money. But all this does is create smoke, reduce heat and upsets the neighbours. And, eventually, it will block the chimney. If air flow in the flue is blocked by creosote, or a build up of soot on the baffle is blocking air flow, then the fire will not get sufficient air to burn properly.

## SmartBurn

Another way to help your fire burn better and to reduce wood smoke emissions is with the SmartBurn device. This unique Australian invention contains a mixture of natural ingredients which, when heated, release a small amount of vapour that aids in combustion. This means that more of the gasses and tars are burnt within the firebox rather than going up the chimney as wasted fuel. Authoritative tests have shown that using SmartBurn reduces wood smoke emissions by up to 50%\*, resulting in a 17%\* more effective burn. Under normal burning conditions the SmartBurn device will last approximately 3 months before it needs to be replaced, and during this period will prevent approximately 15kg of smoke emissions from entering the atmosphere. The effectiveness of SmartBurn has been proven in trials run by the University of New England in Armidale. To find out more visit [www.smartburn.com.au](http://www.smartburn.com.au)

\*AHTA Testing Laboratory South Australia.  
Report ATL61-03 December 2003. Test Specification AS/NZS 4013:1999

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