

## **Unflued Gas Heaters - Why Are You Putting Your Health At Risk?**

There is no question according to research found easily on the internet, about unflued gas heaters producing several by-products which are harmful to human health, at all ages! Of these by-products the most noxious are:

- **Carbon Monoxide**
- **Nitrogen Dioxide**
- **Carbon Dioxide**
- **Formaldehyde**

The following report by the **Federation of Australian Scientific & Technological Societies** (FASTS), on the pollutants released by these heaters, should make you think twice about whether you really want to play Russian Roulette, with your health!

If you did not already know, Australia is ripping out these deadly devices from our schools. So do we really want them in our homes? Of course not!

Have your say, on what you think about this type of heater, polluting not just our homes but our children's classrooms. Visit [COUGH](#) a **Campaign Opposing Unflued Gas Heating** in schools.

Remember this, what affects the young also affects the old. It is never too late to use a healthy efficient alternative, such as a reverse cycle heating system. A reverse cycle heating system is the only type of heating system to give out more power, than it uses! When installed to match your needs, a reverse cycle heater will work out cheaper to run on a comparable heat output, to an unhealthy unflued gas heater. Do you really want to use your lungs as the flue & burn excess dollars?

### **How Do The Manufacturers Get These Heaters Approved?**

Often in the instruction manual or specifications, it is commonly stated that these heaters must be operated with a window open, for ventilation. Of course the majority of households we visit, are unaware of this fact and see it as a logical stumbling block to open a window when they are trying to keep warm. All homes wish to keep the cold outside!

See all the facts and evidence on these unhealthy gas heaters at [www.cough.org.au](http://www.cough.org.au).

You have to ask yourself, why is it that unflued gas heaters are banned from use in all schools, except those in NSW? Why are these heaters banned from use full stop in some countries? And just as important, who is funding the research that somehow misses the health concerns, that are so well known and documented by others! And why are these facts being suppressed? In whose interest?

It's never too late to make a difference! After all, you do not want to be left with the legacy of an unflued gas heater. GASPING FOR YOUR LAST BREATH due to damage inflicted!

Have your say, visit the [COUGH](#) website!

On the following page is a copy of the report by the Federation of Australian Scientific and Technological Societies (FASTS), which is also hosted on the COUGH website.

Every day that you send your child  
into a classroom with an unflued gas  
heater operating...  
... you are poisoning them.



### **Scientific Research On Unflued Gas Heating**

Unflued gas heating produces several by-products which are harmful to human health. Of these by-products the most noxious are carbon monoxide, nitrogen dioxide, carbon dioxide and formaldehyde.

The following information about these indoor pollutants comes from the Federation of Australian Scientific and Technological Societies (FASTS).

#### **Carbon monoxide**

##### **4.1.1 Sources**

Carbon monoxide is formed by the combustion of carbon-containing substances (often in the form of fossil fuels). Important potential indoor sources include:

- flueless or poorly flued gas heaters ...

##### **4.1.2 Possible health effects**

Carbon monoxide binds with haemoglobin to reduce the blood's oxygen-carrying capacity. At high concentrations this can be fatal; at lower concentrations symptoms include headache or loss of concentration. There is now consistent evidence that people with heart disease are a susceptible sub-population and are at risk at relatively low levels. ...<sup>1</sup>

##### **4.1.6 Summary**

- Is it of concern?

Given that there have been recent deaths from exposure to carbon monoxide indoors, and the

very significant number of people potentially exposed to it, carbon monoxide clearly remains a pollutant of concern.

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<sup>1</sup> Reduced post-natal development has been reported as a possible consequence of chronic exposure to carbon monoxide: EPA 'The State of Air Indoors'. <[http://www.environment.nsw.gov.au/soe/97/ch1/14\\_3.htm](http://www.environment.nsw.gov.au/soe/97/ch1/14_3.htm)> accessed 25 March 2007. See also European Commission, Institute for Health and Consumer Protection, Physical and Chemical Exposure Unit, *The Index Project - Final Report: Critical Appraisal of the Setting and Implementation of Indoor Exposure Limits in the EU* (2005).

#### **4.1.7 Possible actions**

Few people appear to be aware of the risks posed by carbon monoxide emitted from poorly maintained or poorly operating flueless combustion appliances such as gas heaters and gas stoves.

**... A program to replace older flueless gas heaters with flued gas heaters or reverse-cycle air conditioning would reduce exposures to unacceptable levels of carbon monoxide.**

### **Nitrogen dioxide**

#### **4.2.1 Sources**

Nitrogen dioxide is formed as a by-product of combustion through the fixing of atmospheric nitrogen. Important potential indoor sources include:

- flueless gas heating ...

#### **4.2.2 Possible health effects**

Nitrogen dioxide is an oxidising gas that irritates the lungs. There is evidence that it suppresses the body's immune system. At very high levels, nitrogen dioxide can cause fatal swelling of the lungs. At lower levels, symptoms include exacerbated asthma and more frequent and more severe respiratory illness. Australian epidemiological research confirms overseas findings that there is a significant correlation between exposure to nitrogen dioxide and adverse health outcomes, including increased hospital admissions for sufferers of childhood asthma and heart disease. ...

#### **4.2.3 What is known about it and its levels in Australia?**

In 1989, monitoring in NSW government schools, where flueless gas heaters are common, found levels of up to 2.9 parts per million nitrogen dioxide. Seven per cent of heaters exceeded the then NHMRC 'level of concern' of 0.3 parts per million (McPhail *et al.* 1989; McPhail & Betts 1992). After an extensive program of servicing heaters and rectification, which included the installation of new 'low-NOx' heaters in some cases, heaters exceeding the level of concern dropped to 2.9 per cent (NSW Department of Public Works 1992) but returned to 6.1 per cent in 1993. Indeed, in 1993 some of the new 'low-NOx' heaters were found to exceed the level of concern (Department of School Education 1993). Given that there were, at this time, some 44,000 flueless gas heaters in use in NSW government schools, it could be estimated that more than 2,000 of them were not performing adequately. It is difficult to estimate how many students this may have affected given that students move between rooms for some lessons, for example, but it would be expected to exceed 50,000. The number exposed to levels exceeding the NEPM ambient standard would be significantly greater since the then 'level of concern' was over 2 times higher than the NEPM standard.

#### **4.2.6 Summary**

- Is it of concern?

Yes. Many thousands of tests have shown a widespread problem. When many of the studies were undertaken, the ambient NHMRC goal for nitrogen dioxide was set at 0.16 parts per million, with a 'level of concern' for indoor air of 0.30 parts per million. Since then, the NEPM process has established a national ambient standard of 0.12 parts per million. This tightening of the ambient benchmark reflects increased concerns about the potential harm caused by nitrogen dioxide. Clearly, this concern transfers to the indoor environment, particularly in view of the large number of people exposed to levels near or above the standard.

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- Possible actions

Decisive action to reduce exposure to nitrogen dioxide indoors is hampered by the lack of a standard against which to evaluate measurements. ...The emissions performance of flueless gas heaters deteriorates with time. **(T)here needs to be an immediate program to alert users of older heaters of the potential risk.** These heaters could be part of concerted government action to encourage users to shift to flued heating ... **All governments need to consider funding a heater replacement program**

### **Carbon dioxide**

#### **5.1.1 Sources**

Carbon dioxide has the same sources as carbon monoxide (section 4.1).

#### **5.1.2 Possible health effects**

Carbon dioxide at elevated levels can cause headaches and may cause changes in respiratory patterns. ...

### **Formaldehyde**

#### **6.2.1 Sources**

Formaldehyde ... can also be emitted from flueless gas appliances. A recent preliminary study indicated excessive levels of formaldehyde can be emitted from a 'low NOx' flueless gas heater under some conditions.

#### **6.2.2 Possible health effects**

Formaldehyde is an irritant gas that potentially affects the skin, eyes and lungs. Some people can become hypersensitive to its effects, resulting in symptoms at very low concentrations. There is evidence that it is a nasal carcinogen.<sup>2</sup>

#### **6.2.3 What is known about it and its levels in Australia?**

(I)n a recent study by Brown *et al.* (2002) examining three low NOx flueless heaters, in a steel emissions chamber, levels from one heater reached concentrations that were more than 15 times the NHMRC goal under some conditions. Formaldehyde is not found at other than background levels in the ambient environment ... (t)hus indoor exposures are many times more significant in terms of health.

#### **6.2.6 Summary**

... Standards for flueless gas heaters should include an emission limit for formaldehyde as well as emission limits for nitrogen dioxide and carbon monoxide.<sup>3</sup>

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<sup>2</sup> In addition formaldehyde can cause wheezing and coughing, fatigue, skin rash and severe allergic reactions: EPA 'The State of Air Indoors' <[http://www.environment.nsw.gov.au/soe/97/ch1/14\\_3.htm](http://www.environment.nsw.gov.au/soe/97/ch1/14_3.htm)> accessed 25 March 2007. See also European Commission, Institute for Health and Consumer Protection, Physical and Chemical Exposure Unit, *The Index Project - Final Report: Critical Appraisal of the Setting and Implementation of Indoor Exposure Limits in the EU* (2005).

<sup>3</sup> Federation of Australian Scientific and Technological Societies Occasional Paper Series Number 5, October 2002, *Indoor Air Quality in Australia: a Strategy for Action*, pp 9-28.

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The nature of unflued gas heating means that these poisonous by-products are released directly into the area where the heat is generated – in the case of classrooms, this means directly into the air that the children breathe. The New South Wales State of the Environment 2006 report indicates that:

(i)ndoor air quality is an important issue for human health. It is estimated that people spend between 75% and 85% of their time indoors where the quality of the air can be poorer than outdoors. Ongoing research continues to highlight the impacts on indoor air quality, especially the outgassing or release of formaldehyde ... and also the operation of unflued gas heaters ...<sup>4</sup>

The following is a list of studies that have examined the effect of unflued gas burning and the effect of its by-products on the respiratory and mental health of children. Table 4 is a list of just some of the many scientific studies that make clear the connection between the use of devices like unflued gas heaters and health problems, like asthma, in children.

**Table - A brief selection of scientific studies that connect unflued gas burning (in devices such as gas heaters) with health problems in children**

Author	Article title	Journal	Citation	Finding
Pilotto et al	Randomized controlled trial of unflued gas heater replacement on respiratory health of asthmatic children	International Journal of Epidemiology	IJE (2004) vol 33 no 1 pp 208-211	Asthma symptoms were reduced following a replacement intervention that removed high exposure to NO <sub>2</sub> . Such a replacement should be considered a public health priority for schools using unflued gas heating during winter.
Smith et al	Health effects of daily indoor nitrogen dioxide exposure in people with asthma	European Respiratory Journal	Eur Respir J. (2000) Nov; 16(5); 879-85	Community based asthmatic children have a demonstrable association between increased respiratory symptoms and nitrogen dioxide at levels which are readily encountered in domestic settings. As both asthma and gas appliances are common the findings of this study have considerable clinical and public health implications.
Belanger et al	Association of Indoor Nitrogen Dioxide Exposure with Respiratory Symptoms in Children with Asthma	American Journal of Respiratory and Critical Care Medicine	Am J Respir Crit Care Med Vol 173. pp 297-303 (2006)	This study has demonstrated an association between indoor NO <sub>2</sub> and increased respiratory symptoms among children with asthma.
Pilotto & Douglas	Indoor nitrogen dioxide and childhood respiratory illness	Australian Journal of Public Health	Aust J Public Health (1992) Sep; 16(3): 245-50	A number of recent studies have suggested that children exposed to significant levels of nitrogen dioxide in the home may be more susceptible to respiratory illness than children exposed to normal ambient levels. ... It has recently been shown in New South Wales school rooms, where unflued gas heaters are often used as a source of warmth, have nitrogen dioxide levels which are above the recommended ambient levels for outside air.
Brown, Mahony & Chang	Room chamber assessment of the pollutant emission properties of (nominally) low-emission unflued gas heaters	Indoor Air	Indoor Air (2004) 14 Suppl 8: 84-91	One type of heater was lower emitting for nitrogen dioxide, but emitted greater amounts of carbon monoxide and formaldehyde (the latter becoming significant to indoor air quality). When operated <i>with low line pressure or slight misalignment of the gas burner, this heater became a hazardous source of these pollutants.</i> (emphasis added) ... (W)ith concerns over potential health impacts to occupants,

<sup>4</sup> <[http://www.environment.nsw.gov.au/soe/soe2006/chapter3/chp\\_3.5.htm](http://www.environment.nsw.gov.au/soe/soe2006/chapter3/chp_3.5.htm)> accessed 25 March 2007.

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				manufacturers have reduced the nitrogen dioxide emissions from unflued gas heaters in Australia over recent years. They have done so with a target level for nitrogen dioxide in indoor air of 300 p.p.b. This is somewhat higher than the ambient air (and WHO) guideline of 110 p.p.b. Several studies of child respiratory health show an impact of unflued gas combustion products. ... Key findings are that the focus needs to be on total gas emissions (not just nitrogen dioxide), and that heater installation can be very sensitive to small faults which lead to very high levels of toxic pollutants.
Ponsonby et al	A prospective study of the association between home gas appliance use during infancy and subsequent dust mite sensitization and lung function in childhood	Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology	Clin Exp Allergy (2001) Oct 31(10): 1544-52	Indoor pollutants from gas combustion may increase the likelihood of initial sensitization to house dust mite (HDM) and play a role in the development of atopic asthma. HDM-sensitized children may be more vulnerable to indoor pollutant-induced airway obstruction.
Ciuk, Volkmer & Edwards	Domestic nitrogen oxide exposure, urinary nitrate, and asthma prevalence in preschool children	Archives of Environmental Health	Arch Environ Health (2001) Sep-Oct; 56(5): 433-8.	These findings confirm that there is a positive association between nitrogen dioxide exposure from gas appliances and the prevalence of respiratory symptoms.

In addition to these scientific analyses of the specific dangers to children of unflued gas heaters the FASTS provides a number of reasons for concern about indoor air quality.

Compared to ambient air quality, relatively little is known about indoor air quality, but what is known generally shows that the situation is much worse worse than outdoors. Furthermore, with limited exceptions, the quality of indoor air is not improving. The following features of indoor air pollution should increase the level of concern of both citizens and all spheres of government.

***A much wider range of possible air pollutants can be found at elevated levels indoors than occur at levels of concern outdoors*** (see, for example, Wadden and Scheff 1983; Newton *et al.* 2001). This is because many of the sources of indoor air pollution are only found indoors. Pollutants such as some solvents, formaldehyde, environmental tobacco smoke and house dust mite allergen, to name just a few, are rarely, if ever, found outdoors at levels of concern. But in common indoor environments they may frequently be present at levels which are injurious to health, particularly for susceptible sub-populations of the community. ...

***There is serious cause for concern—the appropriate response is immediate action to improve the situation.*** The pollution levels found, the extent of the potentially exposed population and the presence of vulnerable sub-populations all demonstrate that there is cause for concern about the quality of Australia’s indoor air. ...

Citizens have little idea about the effect indoor air quality may be having on their health, or its potential impact on their economic well being. In these circumstances, they are inadvertently doing things such as using appliances or products that are actually harming them and those around them, including dependent children.

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We know from experience that substantial change is possible when citizens have become aware of possible dangers. The community cooperates in making the changes; sometimes it is the driving force behind them. The best example is the measures to reduce exposure to environmental tobacco smoke in public areas. However, in too many areas, citizens simply do not have access to the information that would enable them to make informed choices or to improve the situation.



Sometimes the information is not available or is not in a readily accessible form. Regrettably, there are occasions where available information may not be promulgated in a readily accessible way or is suppressed because it is convenient to do so. While progress has been made, in many areas citizens are poorly informed and in the absence of public information, government has failed in its duty of care to protect people from the adverse effects of indoor air pollution. This is in stark contrast to the situation in the ambient environment, where concerted action over several decades has brought substantial and sustained improvements. Any changes regarding indoor air have been mostly incremental and largely uncoordinated.<sup>5</sup>

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<sup>5</sup> Federation of Australian Scientific and Technological Societies Occasional Paper Series Number 5, October 2002, *Indoor Air Quality in Australia: a Strategy for Action*, pp 7-8.