

Unflued Gas Heaters in NSW Schools

Background

NSW stands alone as the only mainland state in Australia that permits the use of, and is still installing, unflued gas (UFG) heaters in schools. The NSW Government continues to support the safety of UFG heaters despite independent research showing the pollutants they emit are extremely dangerous for children's health.

In 1988, Teachers Federation organiser Leo Pomery ran a statewide campaign exposing the dangers of unflued gas heaters in NSW schools. As a consequence, heaters have been progressively replaced from the then 'high-NOx' (referring to the nitrogen dioxide output) to 'low-NOx' heaters. Warning signs were put on heaters regarding their emissions with instructions that all rooms using them must have cross-ventilation¹.

Since the heater replacement program began in NSW, more research has become available regarding the pollutants associated with both standard NOx and so-called low-NOx heaters and their effects on children's health. Studies already conducted in NSW schools show the levels of pollution *both* emit exceed international guidelines and are putting children's health at risk.

In 2009 the NSW Government funded a multimillion-dollar study by the Woolcock Institute to: '*Provide independent, reliable and unbiased evidence of the short term impact of exposure to pollutants symptoms and lung function in primary school-aged children*' from low-NOx UFG heaters used in NSW schools.

The very fact that this study has been requested at all illustrates the shaky ground on which claims of safety made about low-NOx heaters in NSW schools stand. This study is a waste of taxpayers' money.

The COUGH campaign

A sustained campaign by parents, teachers and health professionals over many years has continued to put the issue of UFG heating in NSW schools in the media spotlight. The marginal seat of the Blue Mountains has become the epicentre of the UFG heater campaign.

The Campaign Opposing Unflued Gas Heating (COUGH) was founded in 2007 by a coalition of schools in the Blue Mountains and Southern Highlands to get UFG heaters out of all NSW schools as a matter of urgency. **We want no NOx heaters, not low-NOx heaters.**

Children in the Blue Mountains and Southern Highlands, as well as other cold regions in NSW, spend many more hours inside classrooms with UFG heating and are being exposed to more pollutants, so their health is put at greater risk.

The COUGH campaign has moved statewide. Key stakeholders in public education and health have become aware of the COUGH campaign. They have also expressed their serious concern about the dangers of exposing children and staff to UFG heater pollutants.

The peak parents and citizens' body for public sector schools, **the P&C Federation**, voted unanimously in 2009 to support the withdrawal of UFG heaters from public schools and called on State Treasury to immediately fund their replacement with '*priority given to schools in areas most affected by lower temperatures*'.

The **NSW Teachers Federation** has supported the call to remove UFG heaters from NSW schools.

The **Telethon Institute for Child Health Research** (WHO Collaborating Centre for Research on Children's Environmental Health) recommends:

'That UFGH NOT be used in school or homes and that the Asthma Foundation NSW adopts a strong position opposing their continued use and call for removal of all UFGH from indoor environments.'

What about other states?

Queensland, the ACT and Victoria have never had UFG heaters and South Australia has removed them from schools and preschools. Earlier this year the West Australian Government announced it would remove UFG heaters from schools as a precautionary measure to protect children's health.

The contractor replacing the UFG heaters in Western Australia (Zambezi Pty Ltd) has confirmed the heaters are being replaced with flued gas heaters using off-the-shelf products such as Rinnai. When asked why they weren't being replaced with 'low-NOx' heaters, the spokesperson said:

'What's a low-NOx heater? All unflued gas heaters emit pollutants which is why the WA Government is replacing them.'

Unflued gas heaters are an unnecessary risk to children's health

The **Gas Appliance Industry** advises people in relation to UFG heaters that:

'All consumers who suffer from pre-existing respiratory conditions should consider the use of an unflued gas heater on a case-by-case basis.'

Why isn't the NSW Government taking a precautionary approach to the protection of children's health?

According to **Australian Government statistics**ⁱⁱ:

'The prevalence of asthma in Australia is among the highest in the world: between 10% and 15% of children and between 10% and 12% of adults have asthma. Although it is not a major cause of death, asthma is one of the most common problems managed by doctors and is a frequent reason for the hospitalisation of children, especially boys.'

Asthma can be triggered by exposure to air pollutants from unflued gas heaters. Naturally, parents and teachers are eager to remove all possible asthma triggers from school classrooms.

Pilotto Study

The definitive Australian, randomised, controlled and peer-reviewed study on gas heating in schools by Louis Pilotto et al (2003), published in the *International Journal of Epidemiology*, provides answers on the relationship between nitrogen dioxide exposure from UFG heaters and asthma.

In Pilotto's study, UFG heaters were replaced with flued gas heaters and electric heaters in the intervention schools and compared to schools that retained the UFG heaters, in terms of measured air pollutants and health outcomes. The importance of this study is that it measured air pollutants and related them to health outcomes.

The study concluded:

*'Asthma symptoms were reduced following a replacement intervention that removed high exposure to NO₂ [nitrogen dioxide]. Such replacement should be considered a public health priority for schools using unflued gas heaters during winter.'*ⁱⁱⁱ

Hunter New England/NSW Health Study

In 2005, Hunter New England Area Health Service participated in the NSW Health School Heater Surveillance Program in NSW non-government primary schools^{iv}.

At the time, around 20% of non-government schools were still using older style unflued gas heaters, while others had low-NOx unflued gas heaters. The study found, based upon worst-case scenarios and a mild winter, that:

'The highest concentrations of nitrogen dioxide were associated with both low-nox and standard heaters, irrespective of any maintenance policy.' [emphasis added]

The study recommended:

'Non-government schools should consider a staged replacement of standard unflued gas heaters with flued gas or other heating types that avoid internal emissions.'

DET Study

A 2008 study by DET using CSIRO personnel and equipment at Blackheath Public School found that 30% of UFG heaters (an extremely conservative figure due to the way sampling occurred, ie over 4–5 hour periods as opposed to hourly sampling) did *not* meet World Health Organization standards for nitrogen dioxide.

enHealth

An extensive review of available literature on the health effects of UFG heater use in Australia by the Australian Government's Department of Health and Aging (enHealth) in 2007^v found that:

'The evidence indicates that for children (particularly children with asthma), exposure to unflued gas heaters can lead to an increase, arguably even a doubling, of respiratory symptoms.'

So-called 'low-NOx' heaters

The NSW Government has been replacing old style 'blue flame' UFG heaters in schools with 'low-NOx' UFG heaters. The heaters are being exclusively provided by Bowin Gas Appliances.

The Bowin website provides the following 'proven testimony' in relation to its low-NOx heaters:

'BOWIN Lo-Nox™ gas heaters are specified by the NSW State Supply Service for classroom heating applications. The Government has made a commitment to replace all existing "older style" conventional heaters in Public Schools, with BOWIN Lo-Nox™ heaters. This ensures that our children are being educated in not only a warm classroom environment, but also the healthiest classroom environment possible'.^{vi}

The provider of the UFG heaters is using the fact that the NSW Government is installing the heaters as an endorsement of their safety! However, there is no independent scientific evidence that supports the claims made about the safety of low-NOx heaters in operation in schools. In fact, the research suggests the opposite.

The **Telethon Institute for Child Health Research** (WHO Collaborating Centre for Research on Children's Environmental Health) recently provided advice to the NSW Asthma Foundation on the issue of UFG heaters:

'The CSIRO report does not give any confidence that the low-NOx UFG heaters can be operated safely. While there is some reduction in NO₂ emission, the fact that only slight variations in gas line pressure or burner alignment can result in these heaters emitting dangerous levels of carbon monoxide and formaldehyde strongly suggests that these are not suitable for use in schools.'

Cross ventilation requirements for 'safe' operation

For the 'safe' operation of any UFG heater, including low-NOx heaters, safety is entirely dependent on the provision of adequate cross-flow ventilation to avoid the build-up of dangerous pollutants, and an ongoing maintenance program to ensure the heaters are working optimally.

A DET memorandum (DN/09/00202) stated:

'Recent surveys of schools have confirmed the need for the Department's ventilation guidelines to be assiduously implemented; this is particularly the case where cross-ventilation is difficult to achieve where one side of room may have a corridor or enclosed spaces.'

The NSW DET has issued NSW public school principals with a directive that cross-ventilation should be used when an UFG heater is in operation:

'Cross-ventilation requires windows on opposing sides of a room to be opened so as to allow pollutants from the unflued gas heater to escape.'

The cross-ventilation directive for UFG heaters is impractical for the following reasons:

- School classrooms may not be able to provide cross-ventilation, eg if they have been fitted with ceiling grilles or other means of fixed ventilation or only have windows on one side;
- For schools in cold regions, having open windows or doors to provide the required cross-ventilation makes heating impractical – children located near open windows or sitting in the cross-ventilation draft are likely to get cold and the room unevenly heated leading to reduced student/teacher comfort;
- Having open windows or doors to provide the required cross-ventilation makes heating extremely inefficient and expensive to operate;
- Ongoing maintenance is required because small faults can lead to high levels of toxic pollutants;
- Advice must be continually provided to all teachers about the importance of the requirements to maintain cross-ventilation for the safe operation of the heaters.

Air pollutants emitted by unflued gas heaters

According to NSW Health, the air pollutants produced by UFG heaters that are harmful to children's health include: *carbon monoxide, nitrogen dioxide and formaldehyde*.^{vii} While water vapour is not regarded as an air pollutant, as such, moisture build-up also can occur in a room heated with an unflued gas heater. Moisture can lead to the growth of moulds and dust mites, which also have the potential to dramatically affect children's health.

Carbon monoxide (CO) is difficult to detect. It is invisible and has no smell or taste. It can cause toxic effects in humans by depriving the body of oxygen, impairing thinking and reflexes. CO levels rise where an unflued gas heater is in use. People most susceptible to the health effects of CO exposure include those with heart disease, children, unborn babies and the elderly.

A poorly installed heater, or a heater in a room with a lack of ventilation, can cause excessive levels of CO, and can lead to CO poisoning. Many people can experience flu-like symptoms from moderate CO exposure, while at even lower levels of exposure susceptible people can also experience chest pain. Exposure to very high concentrations of CO can result in death.

Nitrogen dioxide (NO₂) is also an invisible and tasteless gas, but NO₂ does, however, have a strong odour. NO₂ levels will rise in a room where an unflued gas heater is in use. Breathing in high levels of NO₂ can cause irritation of the respiratory tract and shortness of breath.

People with asthma and other respiratory diseases are particularly susceptible to the effects of exposure to NO₂. *Children may suffer more often from cold symptoms or asthma attacks if exposed over a prolonged period of time.*

Formaldehyde can also be emitted from UFG heaters. Formaldehyde is an irritant gas that potentially affects the skin, eyes and lungs. It can cause wheezing, coughing, fatigue, skin rash and severe allergic reactions. Some people can become hypersensitive to its effects, resulting in symptoms at very low concentrations. It has been classified as a human carcinogen.

Health effects caused by exposure to air pollutants can occur immediately at the time of exposure or they can be delayed. Some people are more susceptible than others and can suffer health effects more easily than others, such as children with pre-existing conditions such as asthma.

Children are at greatest risk from exposure

It is widely accepted in the medical and scientific literature that children are at greater risk from exposure to air pollutants. This heightened risk derives from the unique biological features that characterise the various stages of their development, right through to adolescence.

Eighty percent of alveoli (air cells in the lungs) are formed as a child grows into adolescence and the developing lung is highly susceptible to damage from exposure to air pollutants. Children also have increased exposure to air pollutants compared with adults because of higher rates of ventilation, activity and development.

Pollutant emission standards

There are no standards or guidelines for 'safe' exposures to indoor air pollutants in Australia. The National Health and Medical Research Council previously had interim guidelines for pollutants such as NO₂ but these were based on outside (ambient) standards.

'Safe' levels for indoor exposure to pollutants associated with UFG heaters can't be quantified, therefore a precautionary approach must be taken.

The USEPA recently reviewed their standards in relation to ambient (outdoor) exposures to NO₂ and have found that sufficient evidence exists to conclude that the 'safe' level needs to be reduced to 100 parts per billion (ppb). This is lower than the World Health Organization recommendation of 110ppb and dramatically lower than the industry and NSW Government supported figure of 300ppb. The USEPA cited extreme and severe respiratory health issues as the reasoning behind the adoption of this new standard.

These data point to **no safe level of exposure to NO₂ for children indoors**, especially those with asthma. The only course of action is to install heaters that have no emissions.

The COUGH proposal

The NSW Government should cease installing UFG heaters in NSW schools. Any new building works (including BER projects) should not involve UFG heating. We want heating that produces **no** indoor air pollutants.

There are approximately 225 schools in the coldest regions of NSW, where children and staff are at greatest risk because they run the heaters for many months of the year and are exposed to pollutants for longer periods.

To begin the process we recommend the NSW Government start their replacement program in schools in cold regions before winter 2010.

COUGH: Campaign Opposing Unflued Gas Heating

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ⁱ http://www.nswtf.org.au/edu_online/127/unflued.html

ⁱⁱ http://www.healthinsite.gov.au/topics/Asthma_Statistics

ⁱⁱⁱ <http://ije.oxfordjournals.org/cgi/reprint/33/1/208>

^{iv} <http://www.cough.org.au/files/HNE%20PH%20Study%202005.pdf>

^v <http://health.gov.au/internet/main/publishing.nsf/Content/ohp-enhealth-unflued-gas-heater-cnt.htm>, p. 41.

^{vi} <http://www.bowin.com.au/lonox.htm>

^{vii} http://www.health.nsw.gov.au/factsheets/environmental/gas_heaters_fs.html