A guide to healthier homes and a healthier planet

Is your home making you sick?
Did you know that the construction of the building, its light source, how it is heated and cooled or even furnished could be harming both you and the planet? There are easy, affordable steps you can take to make your living space greener and healthier for you and your family, while also reducing your environmental footprint.

This guide will focus on three key features of your home

- Air quality
- Thermal and acoustic comfort
- Light

For each feature we present the latest research on the health and environmental impacts of the homes that we live, work, learn and play in. We also outline suggestions for green home improvements, from how your home is designed to the materials you use to furnish it, that help improve your health and your environment, and could even benefit your pocket.

Why green buildings?
On average we spend 90% of our time indoors. Because the world’s buildings have a direct impact on our environment and our wellbeing, we need to look at ways to make our buildings good for human health as well as beneficial to natural, urban and suburban environments.

Currently buildings and construction account for

- 36% of global energy use
- 39% of global energy-related carbon emissions

Positive personal action, like saving energy, and energy-efficient renovation, will not only unlock unexpected health and financial benefits in your home, but will also help address what the World Health Organisation calls the biggest global health threat of the 21st century – climate change.
Air quality

More than half of the air you'll breathe in your lifetime is inhaled inside your home\(^1\). However, for 92% of us, the air outside our homes is not safe to breathe\(^2\). This polluted outdoor air harms our health and our planet, and infiltrates into our homes. Air pollution can also be caused by pollutants within the home.

Health impacts

There are three ways that air pollution can be harmful to human health in and around our homes and communities.

Outdoor air pollution experienced when we're outside is responsible for an estimated 1/3 of lung disease deaths, 1/4 deaths from respiratory infection and 1/6 deaths from heart disease and stroke\(^3\).

Outdoor air pollution experienced when we're inside. This polluted air infiltrates into our homes, so a significant portion of our exposure to these outdoor air pollutants occurs when we're indoors\(^4\).

Indoor air pollution produced inside can be just as harmful as outdoor pollutants\(^5\). These include pollution created from cooking and heating with traditional biomass coal stoves, as well as toxic chemicals, such as Volatile Organic Compounds (VOCs), emitted from cleaning products, furnishings, and paints in your home.

Environmental impacts

Many pollutants generated in our homes also damage our natural environment. Short Lived Climate Pollutants (such as methane, or black carbon/soot) are dangerous air pollutants that come from fossil fuel combustion, vehicles and agriculture. Such pollutants are powerful climate forcers in warming our planet.

Approximately 45% of global warming can be attributed to Short-Lived Climate Pollutants\(^6\).

Dramatically reducing Short-Lived Climate Pollutants in the years ahead would slow global warming by as much as 0.5\(^\circ\)C by 2050\(^7\).

Economic impacts

An estimated 5.5 million lives were lost in 2013 to diseases associated with outdoor and household air pollution. These deaths cost the global economy about US$225 billion in lost workforce productivity and over US$5 trillion in welfare losses\(^8\). China has lost substantial chunks of national GDP due to lower productivity from pollution – 6.5% in 2016\(^9\). The annual cost of asthma and pulmonary disease is EU82 billion across Europe\(^10\) and CAN$8 billion in Canada\(^11\), which we know is being worsened by air pollution.

Air quality improvements for a green and healthy home

Simple, low-cost strategies can offer you, your family and the planet huge benefits.

- Use green energy to improve outdoor air pollution by installing solar panels on your roof or switching to a renewable electricity supplier.
- Add outdoor air-purifying vegetation to your home, like a green roof or wall, that also offers weather protection.
- Ventilate your home to clear away the hidden indoor toxins. Increase air flow and freshness simply by opening windows or, if outdoor air is polluted, use efficient mechanical ventilation or hybrid strategies, powered by renewable energy sources.
- Choose non-toxic (low-VOC) paints and furnishings to reduce indoor pollutants. VOCs can build up to 1,000 times outdoor levels within homes, and can cause Sick Building Syndrome, cancer, and damage to our liver, kidney, nervous system and mental performance\(^12\).
- Don’t let your home become a sick building. Sick Building Syndrome is characterised by a number of symptoms, from mild headache, fatigue and dry eyes, to more severe allergies and asthma attacks, that occur when you are in a building with poor air quality. It has been associated with poor ventilation and build-up of pollutants like VOCs, mould and bacteria and carbon monoxide\(^13\).

Did you know?

- 52% of poor indoor air quality can be attributed to inadequate ventilation\(^14\). Natural ventilation has been seen to reduce lung-related illnesses by up to 20\%\(^15\), so open those windows!
- Only 60 x Around 12,000 litres of air\(^6\) is inhaled and exhaled daily – the volume of about 60 bathtubs.

Air quality improvement tips

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An uncomfortable home that is too hot, too cold or excessively noisy can cause severe health issues for its occupants. It can also waste energy and money. In this section we will look at thermal comfort and acoustics, and showcase a range of positive measures to optimise them for your health, your pocket and the environment.

Health impacts

In most EU countries, only 10% of buildings can report good levels of energy performance[23]. Poor insulation and construction of buildings is often the cause of this low energy efficiency, and can severely compromise the occupant's comfort and health.

65% of Europeans who live in major urban areas are exposed to dangerously high levels of noise pollution[24], which lead to health issues like stress, high blood pressure, hypertension and strokes[25]. Chronic exposure to noise can also adversely affect children’s cognitive development[26].

Respiratory illnesses, asthma, and poor mental health have been associated with living in damp, cold housing, which is a breeding ground for mould. Up to one-third of Canadian buildings show signs of dampness or mould[27], and today 2.2 million Europeans have asthma, partly as a result of their living conditions[28].

Our changing climate is expected to lead to a rise in heat waves across the world. Colombia is expected to suffer 2,000% more heat-related deaths during the period 2031 to 2080 compared with 1971 to 2010[29], so future-proofing homes to protect occupant health is of growing importance.

Environmental impacts

Energy efficient homes with good thermal comfort from high quality building fabric enjoy lower heating and cooling requirements, reducing a home’s climate-changing carbon emissions.

Air conditioning uses around 6% of all electricity in the USA[30], and many older systems still use highly polluting CFC and HFCs refrigerants, which are a huge contributor to climate change.

Insulation retrofits across 46 million US homes are predicted to result in 100,000 fewer tons of nitrous oxide emitted, corresponding to 6,500 fewer asthma attacks, 240 fewer deaths and $5.9 billion per year in financial savings[31].

Economic impacts

Energy efficient properties can help save on energy bills. An Australian study on home energy efficiency retrofits suggests average energy bill savings of $108 per year[32]; and American Consumer Reports have suggested that sealing leaks within homes can reduce energy costs by approximately 15%[33]. In New Zealand, building 100,000 homes to certified Homestar standards could provide benefits of $680 million in energy and water savings[34].

Comfort tip

Insulation should work three ways – keeping heat inside buildings in cold climates, trapping heat outside in hot climates, and maintaining comfortable acoustic by blocking traffic or neighbour noise. A good building fabric is key, wherever you are in the world.

Footnotes here
Good quality light is essential for a healthy life. In green and healthy homes, maximising the use of daylight and being efficient in your lighting use will cut energy bills, lower your carbon emissions, and unlock health benefits for you and your family.

**Health impacts**

Living in a dark home has been shown to undermine the occupant’s health and wellbeing. One study looking at living in a dark home found health worsened by 50%, with headaches, insomnia, depression, Seasonally-Affected Disorder (SAD) and even breast cancer and suicide among the reported effects.

Natural light regulates our body’s circadian rhythms, often disrupted by technology and light pollution, improving sleep quality and therefore health overall. Studies have shown that exposure to natural light during the working day leads to 46 minutes more sleep each night, demonstrating the importance of bringing healthy light into our homes.

Allowing daylight into your home controls damp, mould and bacteria growth, lowering the risk of asthma and other respiratory diseases.

**Environmental impacts**

Making more use of daylight in our homes through windows and skylights cuts down on artificial lighting, saving energy. Combining that with the most energy efficient lighting technology can substantially reduce your home’s carbon footprint. Lighting is one of the biggest contributors to greenhouse gas emissions from dwellings across the world. The amount of electricity consumed by lighting is almost the same as that produced from all gas fired generation.

In developed countries, lighting in homes accounts for around 14% of electricity consumption, with this share understood to be higher in less developed nations.

Research has shown that increased daylight can reduce the need for artificial lighting by 16-20%.

**Economic impacts**

Lighting in many homes accounts for roughly 20% of the electricity bill. Studies suggest that just switching ten bulbs to efficient equivalents can pay back four times the initial cost in just one year.

Don’t let your home make you SAD

Seasonal Affective Disorder is a depressive illness linked to the availability and change of outdoor light in the winter. Experts estimate that up to 30% of the world’s population suffer from different degrees of Seasonal Affective Disorder.

Choose more efficient LED light bulbs. LED light bulbs can last twenty times as long as regular incandescent light bulbs and can cut energy use by up to 80%.

Use timers and dimming sensors to reduce energy waste.

Awnings, blinds and solar films can be applied as a retrofit to your existing windows allowing you to control temperatures without compromising on access to light.

Did you know? Studies have shown that people are 150% more likely to report ill health when they live in a dark home. Protect your health and open those blinds!
In Australia, air pollution is estimated to kill more people every year than road traffic accidents. The shift to clean energy and transport could save the Australian economy up to $6 billion annually in avoidable health costs.

A project in India demonstrates that by retrofitting windows within homes, families can make savings of between 30-50% on their energy bills and enjoy healthier homes.

In South Africa, environmental factors, such as air and water quality, are associated with the deaths of 124 in 100,000 children under five. Many of these could be preventable with healthier homes and communities.

The potential for savings from energy efficiency is estimated at 21% of projected total energy supply in MENA countries by 2025, with residential buildings being one of the largest areas with scope for savings.

WHO estimates that approximately 50,000 deaths each year are attributable to ambient air pollution, and 80,000 to household air pollution in Latin America and the Caribbean.

About 4.3 million people die from household air pollution and 3.7 million from ambient air pollution, most of whom (3.3 and 2.6 million, respectively) live in Asia.

The World Bank estimates the total health cost associated with outdoor air pollution in urban areas of China in 2003 was between 1.2-3.3% of China’s GDP.

Air-conditioning is estimated to take up as much as 60% of the overall electricity load in South-Asian countries.

Over half of the planet’s new buildings are constructed in Asia annually and the construction sector constitutes an estimated 25% of overall energy consumption.

The health burden to the US caused by particulate pollution from fossil fueled power plants correlates to over 5 million lost workdays in the US each year.

The World Bank Group estimates that by 2030, three billion people, or 40% of the world’s population will need new housing units.

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Global features
Local practice

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