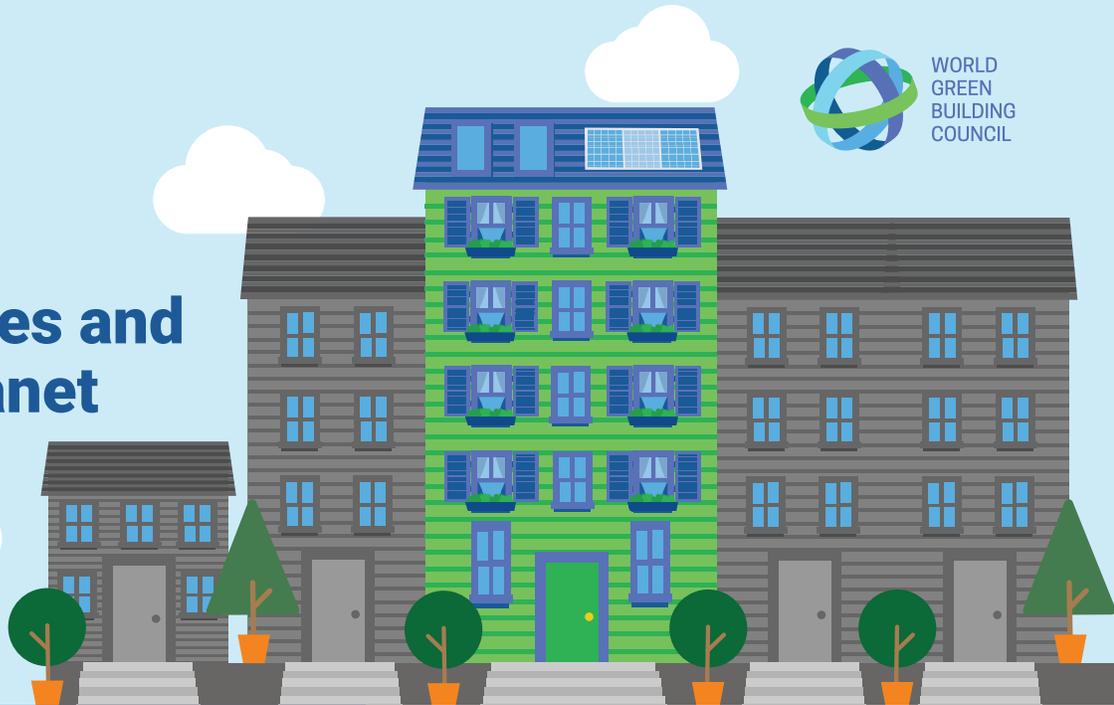


A guide to healthier homes and a healthier planet



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



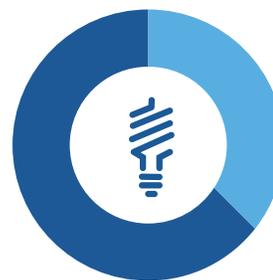
Light

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.

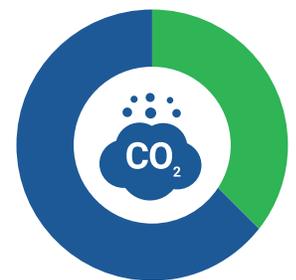
Why green buildings?

On average we spend 90% of our time indoors¹. 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 use²



39%
of global
energy-related
carbon emissions³

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 century⁴ – climate change.**

Air quality

More than half of the air you'll breathe in your lifetime is inhaled inside your home⁶. However, for 92% of us, the air outside our homes is not safe to breathe⁷. 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.

60x
Around **12,000 litres of air**⁵ is inhaled and exhaled daily – the volume of about **60 bathtubs**.

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 stroke⁸.



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 indoors⁹.



Indoor air pollution produced inside can be just as harmful as outdoor pollutants¹⁰. 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 Pollutants¹³.



Dramatically reducing Short-Lived Climate Pollutants in the years ahead would slow global warming **by as much as 0.5° C by 2050**¹³.

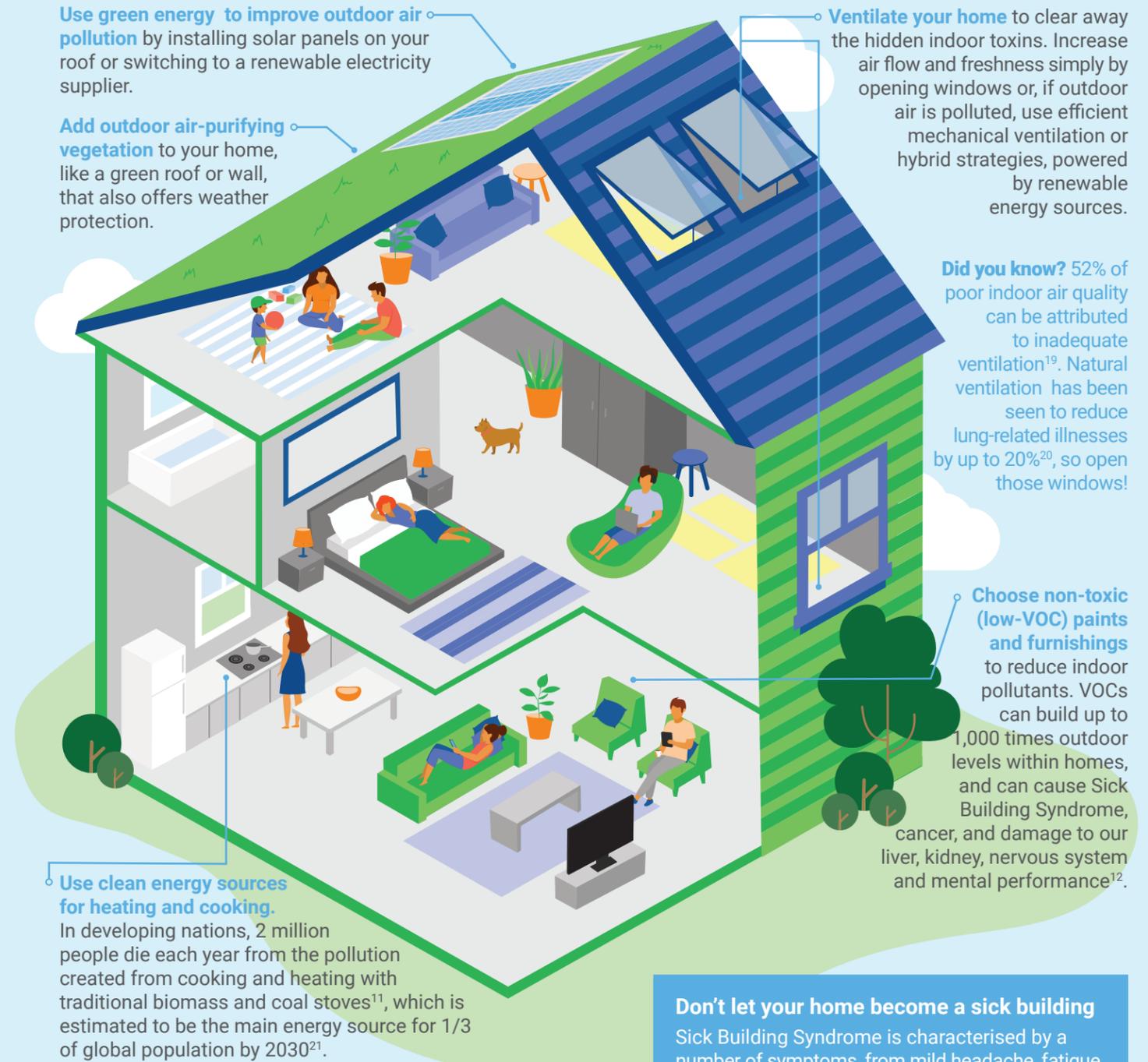


Economic impacts

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 losses¹⁵. China has lost substantial chunks of national GDP due to lower productivity from pollution – 6.5% in 2016¹⁶. The annual cost of asthma and pulmonary disease is E82 billion across Europe¹⁷ and CAN\$8 billion in Canada¹⁸, 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.



Did you know? Babies and young children are at highest risk of health hazards from indoor chemicals²². Crawling babies and young children, due to exposure to carpets and flooring materials, can be at risk of damage equivalent to the child smoking three cigarettes per day.

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 monoxide¹⁴.



Thermal and acoustic comfort

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 performance²³. 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 mould²⁷, and today 2.2 million Europeans have asthma, partly as a result of their living conditions²⁸.



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 2010²⁹, 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 USA³⁰, 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 savings³¹.



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 year³²; 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 savings³⁴.

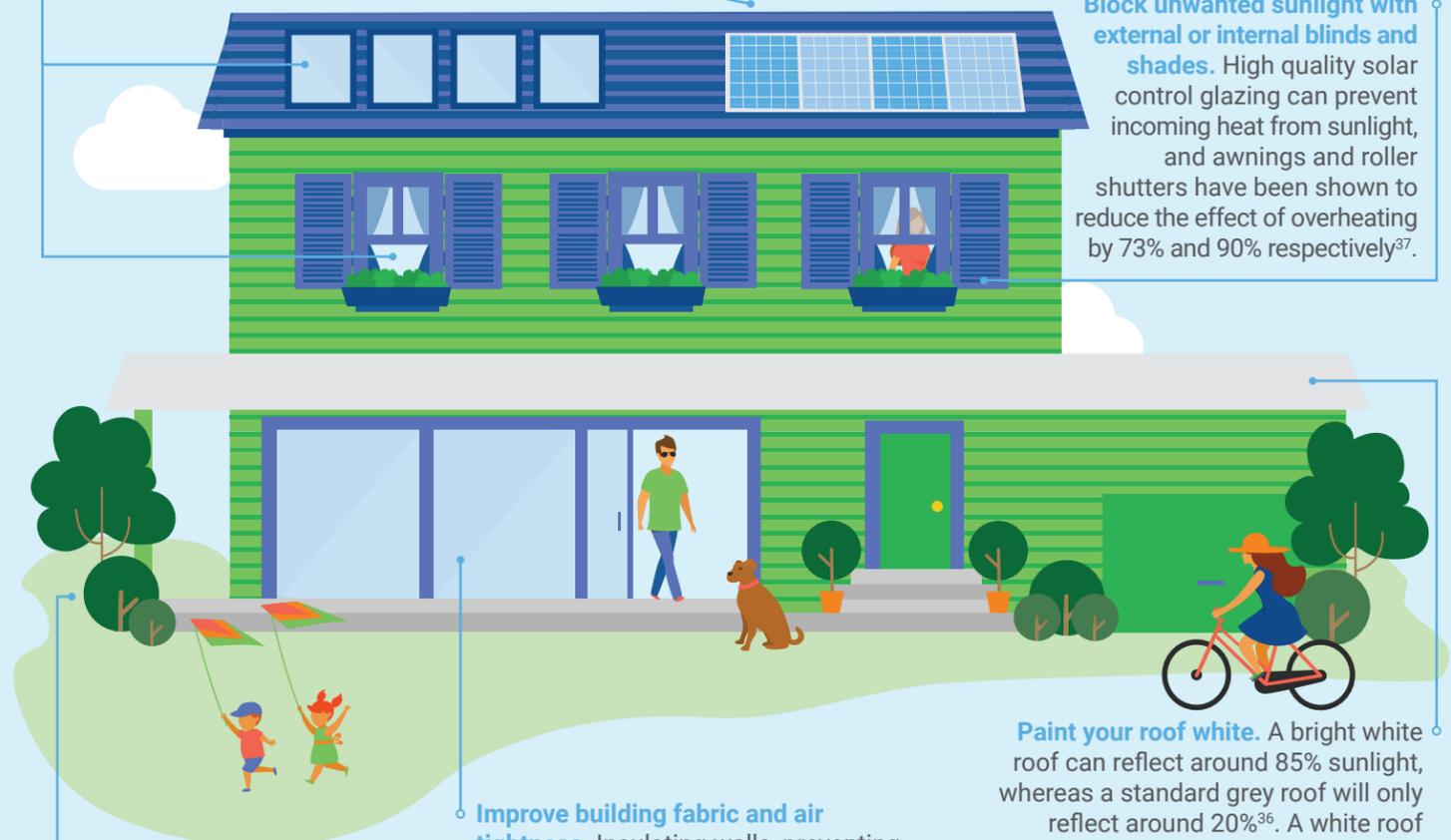
Thermal and acoustic improvements for a green and healthy home

There are lots of affordable things you can do to make your home more comfortable, healthier, and better for the environment.

Increase ventilation and air flow for natural summer cooling. Passive ventilation, ideally with two open areas across a space, can yield up to 25-50% in energy savings from reduced air conditioning use²⁰. Ceiling fans can also provide a low energy alternative to air conditioning.

Sometimes technology is needed to provide comfortable conditions, like cooling in hot climates. Minimize your energy need and utility bills with a well insulated building, and power conditioning devices by renewable energy³⁹. **Solar panels are known to provide a good payback on investment** across the world, with experts citing between **1-4 years to reimburse investment in solar panels for a typical US home, while providing 30 years of clean energy.**

Block unwanted sunlight with external or internal blinds and shades. High quality solar control glazing can prevent incoming heat from sunlight, and awnings and roller shutters have been shown to reduce the effect of overheating by 73% and 90% respectively³⁷.



Plant trees, shrubs and a green roof to cool your home without relying on power-thirsty and expensive air conditioning. Shade from trees can help lessen peak summer temperatures by 2°C to 9°C³⁵.

Improve building fabric and air tightness. Insulating walls, preventing leakage and investing in good quality windows are strategies that have been shown to directly improve health. A 15% reduction in days off school has been measured among children in homes that received energy efficiency upgrades through improved respiratory health³⁸.

Paint your roof white. A bright white roof can reflect around 85% sunlight, whereas a standard grey roof will only reflect around 20%³⁶. A white roof helps prevent your home from overheating in hot, sunny weather.

Comfort tip

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

Light

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 effects²⁸.



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**⁴⁰, 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 diseases⁴¹.

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 generation⁴².



In developed countries, lighting in homes accounts for around **14% of electricity consumption**, with this share understood to be higher in less developed nations⁴³.



Research has shown that **increased daylight can reduce the need for artificial lighting by 16-20%**⁴⁴.

Economic impacts

Lighting in many homes accounts for roughly 20% of the electricity bill⁴⁵. Studies suggest that just switching ten bulbs to efficient equivalents can pay back four times the initial cost in just one year⁴⁶.

Light improvements for a green and healthy home

There are easy changes you can make to your lifestyle and home to ensure access to natural light.

Renovating or buying a new home? Install roof windows and skylights to deliver twice the amount of daylight as similar-sized façade windows and three times as much as dormer windows⁴⁷.

Use timers and dimming sensors to reduce energy waste.

Consider solar controlled glazing in warm climates to allow access to light, while controlling the risk of overheating. 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.

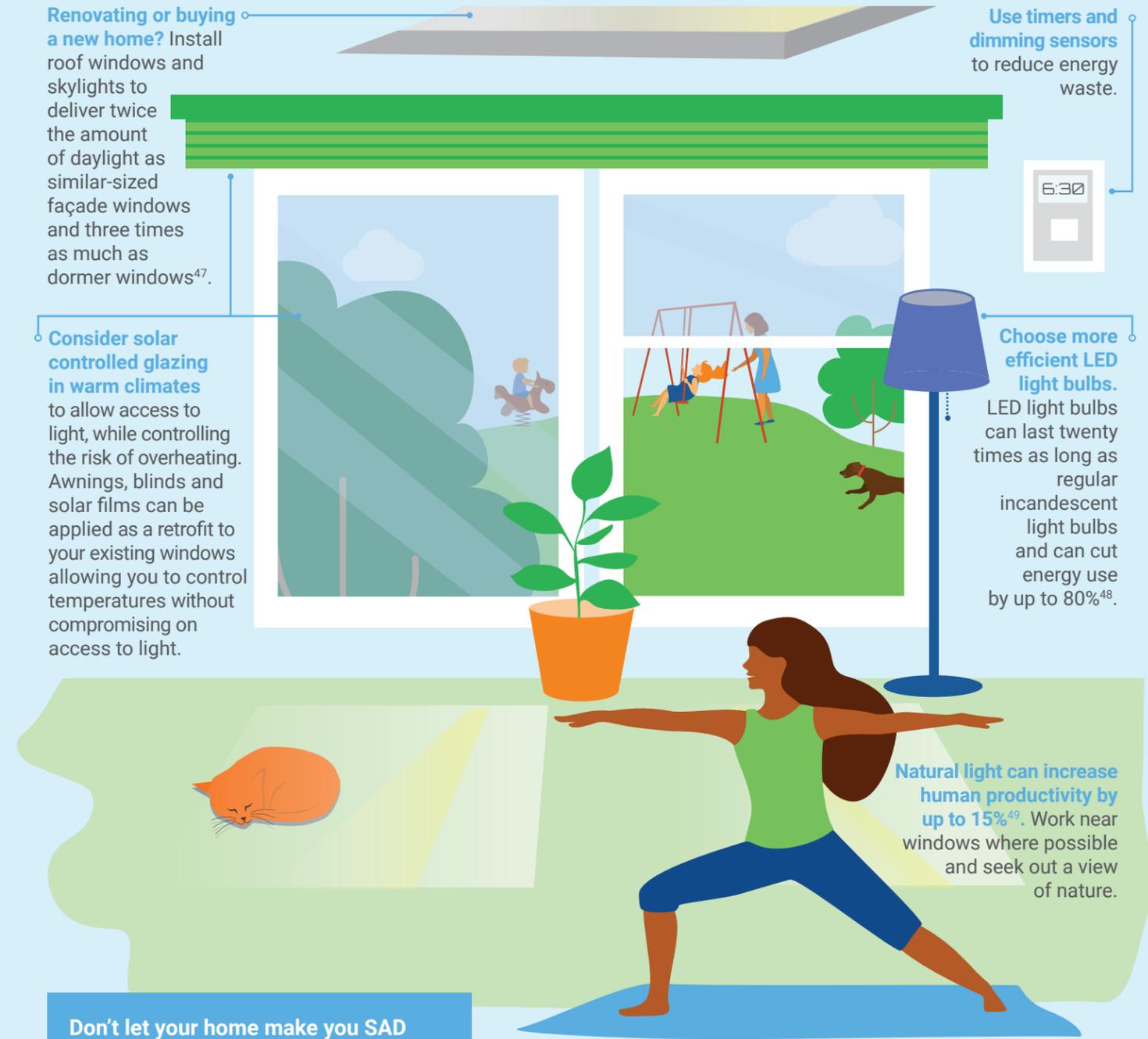
Choose more efficient LED light bulbs. LED light bulbs can last twenty times as long as regular incandescent light bulbs and can cut energy use by up to 80%⁴⁸.

Natural light can increase human productivity by up to 15%⁴⁹. Work near windows where possible and seek out a view of nature.

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 winter⁴². Experts estimate that **up to 30% of the world's population suffer from different degrees of Seasonal Affective Disorder**⁴⁹.

Did you know? Studies have shown that people are 150% more likely to report ill health when they live in a dark home²⁸. Protect your health and open those blinds!



Global features Local practice

Up to **one-third** of Canadian buildings present signs of dampness or mould⁶⁴.

CANADA

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 year⁶⁵.

USA

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 savings⁵⁶.

WHO estimates that approximately **58,000 deaths each year are attributable to ambient air pollution**, and 80,000 to household air pollution in Latin America and the Caribbean⁶⁰.

CENTRAL AND SOUTH AMERICA

87% of deaths from outdoor air pollution occur in **low- and middle-income countries**⁶¹. In these countries, household air pollution is responsible for almost 10% of the mortality rate⁶².

The World Bank Group estimates that **by 2030, three billion people**, or 40% of the world's population will need **new housing units**⁵².

EUROPE

Three out of four detached or semi-detached European homes are **not energy efficient**⁵⁰. In the **UK**, a study estimated that **54% of the population was exposed to noise pollution** above recommended levels of 55 decibels⁵¹.

Half of all childhood pneumonia deaths (2004) were **due to indoor smoke** from biomass and coal cookstoves⁶⁶.

SOUTH AFRICA

In South Africa, **environmental factors**, such as air and water quality, are **associated with the deaths of 124 in 100,000 children under five**⁵⁹. Many of these could be preventable with healthier homes and communities.

A project in India demonstrates that by **retrofitting windows** within homes to **increase daylight** families can **make savings of between 30-50% on their energy bills** and enjoy healthier homes⁵⁸.

INDIA

AUSTRALIA

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 costs⁵⁷.

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**⁵³.

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**⁶³.

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**⁵⁵.

CHINA

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