

Australia's Transition to Energy-Efficient Houses

The Situation

The global recognition of the urgent need to address climate change has shed light on the inadequacy of [Australian housing standards](#) and the need to improve the [minimum](#) requirements of Australian buildings. Compared to international best practices, Australian homes are [falling behind](#) in terms of [energy efficiency](#). By improving building energy [efficiency](#), we can reduce emissions, lower electricity costs, and enhance the comfort of households across the country.

History

Australian homes have historically been known for extreme temperatures—too [hot in summer](#) and too cold in winter—resulting in a heavy reliance on air conditioners and heaters. In the past, the Australian Government focused on stimulating growth by allowing [minimal building standards](#), prioritising quantity over quality to quickly produce as many houses as possible. However, this [approach](#) led to [energy inefficiency](#), with issues like [single-glazed windows](#) and inadequate insulation causing significant [heat loss and gain](#). As a result, there has been increasing demand for [stricter housing standards](#) to improve energy efficiency.

This reliance on air conditioners and heaters is contributing to the current [climate crisis](#), with households across the globe spending on average [35%-42% more](#) on electricity with an air conditioning unit installed. Australians also reportedly have [larger houses](#) on average, covering 214m², making them [less economical](#) to heat and cool and leading to skyrocketing power bills.

Between 1990 and 2016, global use of [air conditioners tripled](#). Today, this use accounts for a quarter of all electricity generated across the planet and as much as [40%](#) of the electricity [generated in Australia](#). Households with an [air](#)

[conditioner unit](#) spend more on electricity compared to households without a unit, creating higher emissions, which in turn lead to [higher temperatures](#), requiring an increased use of air conditioners. This creates an issue of [energy poverty](#), where households either use heating and cooling so frugally they [risk their health](#), or risk not being able to pay the electricity bill.

High-Performance Houses

The best way to break this cycle is to [improve the standards](#) of houses built in Australia. This is achieved by aligning building standards to those of [high-performance houses](#) or the more extreme, [passive houses](#), as explained below. Passive houses require more stringent energy-saving measures than high-performance houses and require certification before being recognised.

The building of high-performance houses will help meet the [European standard](#) of houses where air conditioners are far less common. Currently, only [0.5%](#) of houses in the [UK](#) are fitted with heaters or air conditioners, with the European average being [20%](#), compared to [86%](#) in Australia in 2022. Many European countries are also aligning themselves with the UN's [Energy Performance Buildings Directive](#) in order to have decarbonised infrastructure by 2050. Countries, including the Netherlands, achieve this by enforcing [housing energy efficiency](#) laws on landlords. Houses must comply before tenancy. This will come into effect from 2030.

High-performance houses are defined by four [key factors](#): thermal insulation, airtightness, a ventilation system, and high-performance doors and windows. This effectively reduces the number of thermal bridges in the house and therefore reduces heat loss. Thermal bridges are any areas that allow heat to escape and enter, such as thin windows. The electricity required to power the entire house on average equals [120kWh/year](#), less energy than it takes to power a standard incandescent lightbulb for a full year.

The Model

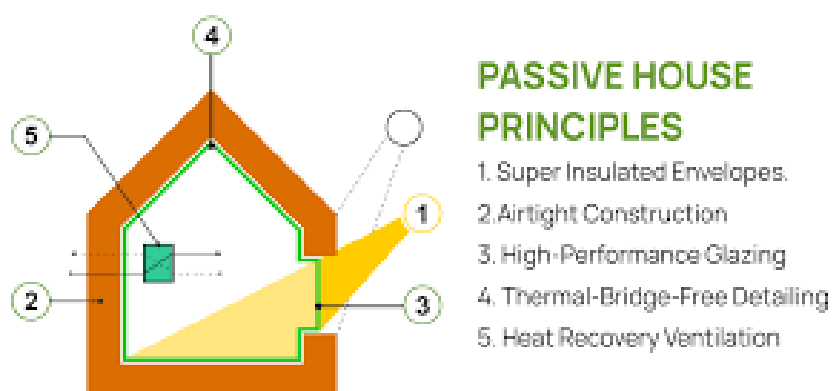
Scandinavian countries, such as [Sweden](#), have had high-performance houses integrated into their minimum building standards since the [1990s](#). People in Sweden enjoy year-round comfort without using air conditioning or heating.

Scandinavian countries rank well when looking at overall CO2 emissions, largely, because of their high housing standards.

Many homeowners and even builders remain **ignorant** of the benefits of high-performance and passive houses. This is due to a tendency to commit to minimum standards and nothing more. More needs to be done within the **building sector** to ensure people, especially **people** most at risk of **climate-related stress**, are aware of the significant benefits of building a high-performance house. Builders are also often unaware of the process to build a high-performance house, despite the benefits.

Passive Houses

Passive houses go beyond high-performance houses. Stringent testing and subsequent **certification** separate passive houses from high-performance houses. A house can only be classified as passive with the certification. The type of testing depends on the climate, with more rigorous testing occurring in hotter climates. The cost to build a passive house is only an additional **3-5%** of the cost to build a standard house, but then reduces energy requirements by 80-90%. Thereby, saving money in the long run.



The key features of a passive house.

Source: [Hazelwood Homes](#)

The Change

Up to **87% of heat** transfer occurs through windows, so upgrades to windows should be a priority. Approximately **11%** of the buildings in Australia currently

have high-performance windows. This includes [double-glazed](#) or even triple-glazed windows. High-performance windows are not yet included in the building regulations but should be prioritised. Recent changes to [building regulations](#) have focused on including wall and floor insulation and weather sealing for new buildings. This has lifted the performance rating of new houses from [6 to 7 stars](#), but older Australian houses have single glazing, gaps around the windows and doors, and a lack of insulation. These gaps are [thermal hotspots](#) that create draughts and thermal bridges.

Older houses have an average star [rating of 1.5](#), which is far from the 6 to 7 stars of new builds and well below the [9 stars](#) needed to be energy efficient. Older houses are typically draughty, have [no insulation](#), and are not designed to take advantage of the sun in winter.

The increased awareness of the need to mitigate climate change combined with a desire to reduce electricity bills is driving a rise in houses considered high-performance. This is despite little change in building standards.

Currently, [65 passive houses](#) have achieved certification in Australia since 2015. Fortunately, the trend is gaining momentum with a few hundred currently in the certification process.

The Benefits of High-Performance Houses

The benefits of passive houses far outweigh any potential drawbacks, with positive ripple effects extending to various other aspects of life. These include significantly reduced energy bills, reduced spending on winter [clothes and bedding](#), and an increase in [work efficiency](#) and other forms of productivity. All while dealing with extreme weather. This makes them an affordable, [eco-friendly](#), and energy-efficient alternative to the normal house model. The emissions saved by one house in Australia reducing their [use of air conditioners](#) and heaters equals 37.5 tonnes over a decade. Equivalent to the average annual footprint of two houses built with today's standards. Imagine if every house did this.

As Australia's population increases by approximately 2% per year, more houses are needed to accommodate the rise. High-performance houses should become a standard to offset any emissions released during the building phase.

Call To Action

Australia is a land of extremes. It gets both very hot and very cold. Therefore, houses need to be built to accommodate these extremes. Individuals can choose to make their new houses high-performance with little extra cost. They will reap the benefits of lower electricity bills and improved comfort with less effort. Sweden is an example of the benefits of high-performance housing. The government must step up and create stronger, mandatory building requirements to ensure households are not reliant on air conditioners through both summer and winter. This means mandatory minimum standards of double-glazed windows, floor and wall insulation, and more airtight construction. The government should also look to aid older houses (more than ten years old) in retrofitting high-performance windows and insulation to improve their heating and cooling ability.

Sustainable Development Goals

Sustainable infrastructure is a key component to achieving the UN's Sustainable Development Goals (SDGs). [**SDG11: Sustainable Cities and Communities**](#) is most applicable, as energy-efficient houses align with it. Creating more sustainable housing will create a more sustainable and resilient community. [**SDG13: Climate Action**](#) is also relevant as climate change mitigation is a key result of the transition to more efficient housing. Work towards SDGs is essential as these are the key strategies to limiting the effects of climate change.

Conclusions

High-performance houses are a growing trend, with the passive house certification becoming somewhat of an achievement. It is essential to strengthen building standards to create more sustainable houses. This will reduce reliance on heating and cooling systems while not sacrificing comfort. Individual views are shifting to a more sustainable mindset and building standards must align more with this mindset to ensure a thrivable future, beyond one that is sustainable. The achievement of such standards can potentially render air conditioners obsolete, owing to improved building insulation and reduced thermal bridges. The reduced need for air conditioners will also help with climate change mitigation, further reducing their future necessity.

As air conditioners and heaters currently use approximately 20% of the world's electricity, this is a significant emission decrease. The current cost of living crisis, combined with a climate crisis, underpins the necessity of high-performance houses.

THRIVE Project

Strong Sustainability is a key pillar of The Holistic Regenerative Innovation Value Enterprise (**THRIVE**) **Framework**. This initiative goes beyond sustainability and the SDGs, to thriving. Where people and the planet are no longer looking at carbon neutrality, but carbon negativity, where people aim to remove more carbon than they produce. As high-performance houses contribute to the factor of Strong Sustainability, they relate to the THRIVE Framework and its **Foundational Focus Factors** (FFFs). These are key indices of a thriving future. **Strong Sustainability** ensures that future conditions are suitable for all creatures. Improving housing standards will improve sustainability through reduced emissions. **Materiality** correlates with building standards. It deals with strategies that create strong sustainability, and if we can further integrate materiality into our building standards, we can improve sustainability in the building industry. Achieving these factors will help lead us to a thriving world.

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