



## TEMPERATURE REGULATION & YOUR FLOOR:

The answer for an  
energy-efficient,  
eco-friendly  
environment

“Given the typical Australian home is built on a concrete slab, Australia represents an ideal location for implementing underfloor heating and cooling systems.”

A variety of heating and cooling options are available to regulate thermal comfort in Australian homes. It is estimated that Australians spend 40 per cent of their energy bills on thermal regulation.<sup>1</sup> Such a large investment means that many people are thinking carefully about what option will ensure comfort while keeping energy bills down.

### **Energy, Economics and the End-User**

Recent years have seen consumers attempting to reduce their energy usage in order to curb costs. Electricity prices are on the rise, with a 61 per cent increase between 2008 and 2014 noted by the ABS, despite a drop in usage.<sup>2</sup> In 2009-2010, 13 per cent of Australian households reported being unable to pay electricity, gas or telephone bills on time.<sup>2</sup> In 2015, the Australian Energy Regulator estimated that in NSW about 108,000 households have an outstanding electricity debt of about \$500.<sup>3</sup> With a recent Canstar Blue survey finding that more than half of Australian households reduced their air conditioning usage in 2016-2017<sup>4</sup> in an effort to save on outgoing overheads, it's now more important than ever to explore alternative possibilities to keeping cool.<sup>5</sup>

The environmental costs of our increasing energy use are also clear. The Australian Bureau of Statistics estimates that energy use accounted for 77 per cent of Australian total greenhouse gas emissions in 2009.<sup>6</sup>

Meanwhile, the public health implications of “the silent killer” of heatwaves are well known – during the heatwave of 2009, over 370 deaths were recorded as a result of heat-related illnesses, making heatwaves the deadliest natural disaster amongst Australians today.<sup>7</sup> With the frequency and intensity of extreme weather events being attributable to climate change at “high confidence”, reducing greenhouse gas emissions across all scales is important if we're to minimise the impacts of climate change.<sup>8</sup>

Temperature regulation systems such as heating or air conditioning represent a significant fraction of Australia's total greenhouse gas emissions. Various energy-efficiency and sustainability challenges are apparent with most traditional heating and cooling options, such as forced-air ventilation. However, there are solutions.

Underfloor heating and cooling represents a cost- and energy-efficient alternative, when correctly installed and paired with a suitable flooring type. Here are some to your question: ‘how does underfloor regulation offer a solution to our spaces’ thermal regulation?

### **The Four Benefits:**

#### **1. Energy-efficient, cost-efficient**

Energy- and cost-efficiency are especially important when considering heating spaces with high ceilings. The traditional placement of heaters within households



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– even those placed on the ground – leads to an inefficient distribution of conditioned air.<sup>9</sup> If you’re attempting to heat spaces typically occupied by people with a system situated close to the ceiling of a space, it requires a hotter output temperature and more energy for it to heat the entire space to a desired level, inevitably leaving other parts of the room colder and creating draughts.<sup>10</sup> Underfloor regulation ensures that all inhabitants of a room experience the same temperature through an even and efficient method of distributing conditioned air throughout the space.

### **The underfloor radiant heating solution: Hydronic Systems.**

Hydronic systems use little electricity to circulate hot water throughout pipes embedded in the floor, allowing the heat to naturally radiate out. Comparatively, forced-air heating loses energy while circulating within ducts before reaching the outlet, thus requiring more energy to heat or cool a space to the same degree. The long-term cost efficiency of hydronic systems is significant, being able to take energy from a wide variety of sources, including renewables such as solar water heaters.<sup>11</sup>

### **2. Health and safety**

Unlike forced-air heating and cooling, underfloor heating does not move allergens such as dust around the room, and creates temperature conditions to discourage mould and bacteria from growing.<sup>12</sup> Also, flooring materials that

have traditionally encouraged people to resort to carpets for warmth – which carry higher VOC emissions – are bypassed entirely with the inclusion of underfloor systems.

With the heating elements embedded within the floor or placed under the floor covering, there is minimal opportunity for burn hazards to manifest as a result of underfloor heating options. Unlike radiators and other forms of air conditioning, it takes up no wall space and likewise does not have any exposed pipes or wiring. Given the energy efficiency of underfloor heating methods, they can also operate at lower temperatures to alternative forms of air conditioning, reducing any risk of fire hazards when heating the floor.

Floor heating systems have been referenced directly as being beneficial within healthcare facilities as well as aged care facilities in general (specifically for those end-users suffering dementia),<sup>13</sup> due to their safety features compared to alternative forms of heating space.

### **3. Longevity and maintenance**

When using “joint-free, full circuit lengths of pipe, underfloor heating is practically maintenance free”.<sup>14</sup> Underfloor heating and cooling systems have minimal moving parts and operate at a lower temperature to other forms of air conditioning, therefore minimising maintenance needs and operating costs outside of initial installation and energy use to lead to optimum endurance.



Image provided by *Premium Floors Australia*

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#### 4. Sound and appearance

In addition to reducing the chances of any fire hazards, all pipework is embedded within the floor to allow the system as a whole to remain invisible. With minimal moving parts, both electric and hydronic underfloor systems also represent a quiet method of heating and cooling your home. Although they are rarely designed to integrate “good impact noise reduction of the floor they are applied to”, one study has shown that “heating systems with the addition of a resilient layer made of a recycled rubber mat seem to provide a good insulation from impact noise sources”, expressing that their usefulness can extend into more than one area of domestic living.<sup>15</sup>

#### Key considerations for flooring options:

##### How to select the best flooring option for underfloor heating and cooling systems.

Regardless of an underfloor or thermal system’s inherent benefits, it needs to be paired with a suitable flooring type in order to maximise its efficiency. While effectively any floor type is applicable, the most ideal systems are

those that conduct heat well – stone, tiles, vinyl, laminate, bamboo and timber all perform to adequate, albeit differing level of efficiency.<sup>16</sup>

#### Timber: key considerations

While stone and tile flooring are the most efficient for underfloor systems, and can have higher temperature thresholds, lower temperature systems can still be used for other floor types. Among cases of timber flooring, engineered timber is the most ideal for pairing with an underfloor thermal system, as the denser, thinner floorboards are better at conducting heat. While less dense timbers can still be used, the thickness of the floorboards must be taken into account so their performance as insulators due to air gaps present in the timber does not outweigh the benefits of an underfloor system.<sup>17</sup>

#### Laminates, vinyls and engineered timbers: key considerations

Like vinyl, laminate, engineered timber performs well with changes in floor temperature and is more

resistant to changes in appearance such as warping – a common problem due to changes in relative humidity levels directly linked to temperature fluctuations. The same applies to bamboo flooring, which is similar in construction to engineered timber. It's important to ensure that an underfloor heating system provides even heat distribution, as "hot spots can cause greater board movement (shrinkage or cupping) in some areas of the floor compared to others".<sup>18</sup>

### Installation models: key considerations

Even the installation method has been seen to impact thermal conductivity and therefore the effectiveness of an underfloor heating or cooling system to conditioning a space. For instance, the floating installation method has been shown to have a lower thermal transfer speed than adhesion installation methods "because of its air layers and polyethylene form".<sup>19</sup>

### Premium Floors

Pairing an underfloor thermal system with a suitable floor type is a simple way to reduce energy consumption, financial overheads and our collective carbon footprint. Premium Floors is currently the largest supplier of timber, laminate, bamboo and cork flooring in Australia. The company's entire portfolio of vinyl and laminate flooring systems, and a large selection of their timber (including engineered timber) floors, are eligible to be used in conjunction with low temperature electrical or hydronic floor heating.

As with any underfloor heating system, correct installation of both the thermal system and floor type is necessary as per manufacturer's instruction. An incorrect or rushed installation process may potentially jeopardise the effectiveness and longevity of both systems. With correct installation, users can benefit from a cost and energy efficient, low-maintenance thermal system for years to come and reduce greenhouse gas emissions to help us all.

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