YES, YOU SHOULD BE CONCERNED ABOUT HUMIDITY.

And This is What You Can do About It

airkind

A humid room is unmistakable. It's not something you have to measure to know it's there. The moment you set foot in a humid space, the heat, mugginess and sense of discomfort hits you. Humidity is the 'feels like' aspect of temperature that's at once hard to measure but impossible to ignore. It's something that can drastically affect how comfortable you feel as well as your overall health and wellbeing.

Humidity and moisture issues affect most buildings. And yet they're often overlooked. The sad reality is that many building owners don't stop to consider what steps they can take to manage humidity. And perhaps that's because few people really understand the implications of humidity. And those that do, in the case of buildings in overly humid places like Miami, UAE and Thailand, often resort to ineffective methods to try to control humidity.

More than simply an indicator of thermal comfort, humidity plays an integral role in the health of a building's occupants, the condition of the building and how energy efficient a building is. And with the incidence of crippling heatwaves accompanied by unbearable humidity on the rise, it's time to wake up and pay attention. That's where the good news comes in. There are practical and often cost-effective steps all building owners can take to control climate comfort and safeguard their buildings against humidity.

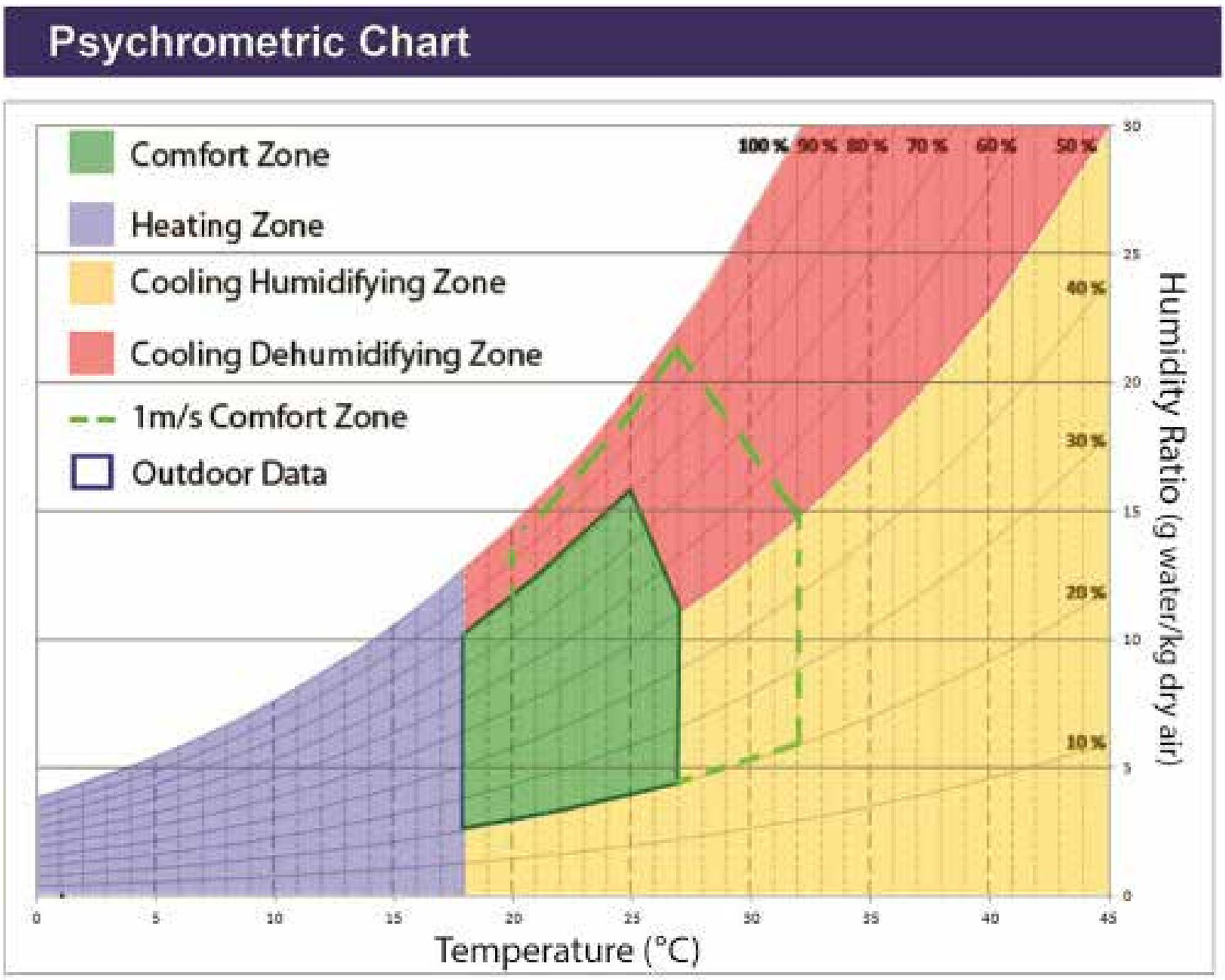
Humidity 101:
What is Humidity Actually?

One of the biggest misconceptions about humidity is that it's about how hot you feel. While that might be part if, that's the not full story. And focusing simply on how hot you feel misses something fundamental. Generally speaking, humidity refers to the amount of moisture in the air. But to really understand humidity, you need to understand how it's measured.

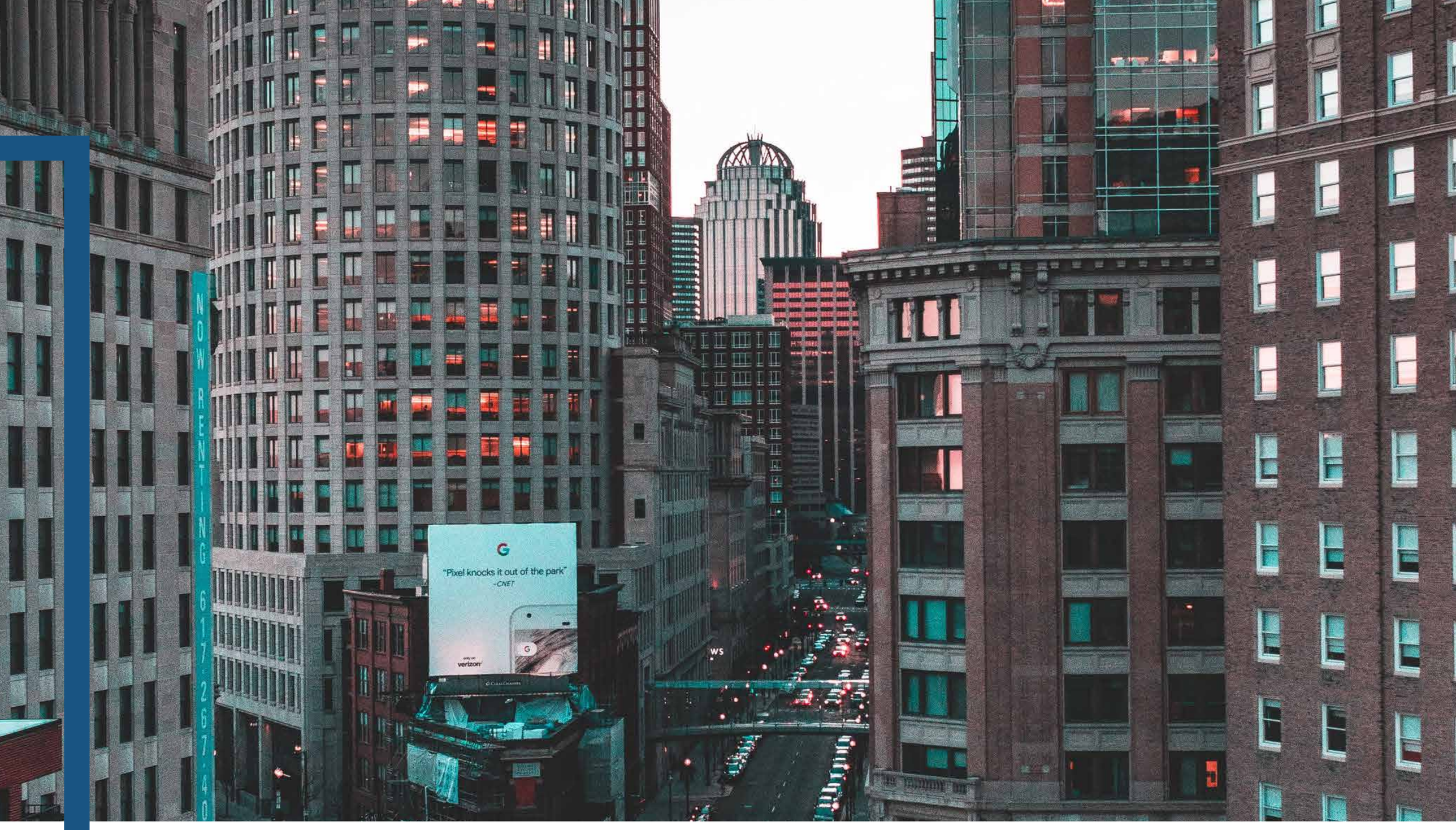
Humidity is often measured in relative humidity. But what is that really? And how is it different to absolute humidity? When we talk about absolute humidity, we're referring to the amount of water vapor in the air. The hotter the air is, the more water vapor it can contain. On the other hand, relative humidity (RH) measures the amount of moisture in the air compared to the maximum amount of moisture the air can hold. RH is how humidity is typically measured and can give you a sense of how much moisture the air can absorb from one's skin in the case of evaporative cooling.

RH is relative to the temperature of the air at a particular moment. But what does that mean? Let's unpack this and how it can impact how comfortable space feels. This means that at a warmer temperature, 50% RH will cause the air to have more water vapor. While at a colder temperature, 50% means the air will contain less water vapor. RH is essential for maintaining climate comfort as if the RH is too high; it will limit cooling via perspiration (evaporative cooling), leaving occupants feeling 'sticky' and uncomfortable.

The following graph defines thermal comfort boundaries:



Source: **ScienceDirect.com**



The other important concept to understand when trying to make sense of humidity is the dew point. This refers to the temperature at which the air needs to cool to reach saturation. In other words, it's the amount of moisture in the air. The higher the dew point, the more moisture in the air. This means it will feel more humid. The dew point is especially significant because it won't change with temperature, but RH will.

Dew point is therefore seen to be a more accurate measure of humidity. It's an absolute measurement. But it's more than that. When you know the dew point, you know the temperature at which condensation happens. This means that if the dew point is above the temperature of a surface, water vapor will condense onto that surface. If the dew point is below the surface temperature, moisture won't condense. This is essential for controlling and stopping the growth of mold.

A good way to understand the pivotal role of the dew point is by considering two rooms with different dew points. Let's say the temperature is 30 degrees Fahrenheit (-1 C) in room A, and the dew point is 30. This means the RH is 100%. In room B, on the other hand, the temperature is 80 degrees Fahrenheit (26 C), but the dew point is 60. In this case, the RH will be 51%. Even though the RH in room A is higher, room B will feel more humid because of the higher dew point.

Humidity in Action

Unlike temperature, it isn't always easy to wrap one's head around humidity and the impact of dew point and RH. Perhaps what also adds to the complexity is that humidity is affected by many different factors, including the temperature of a space.

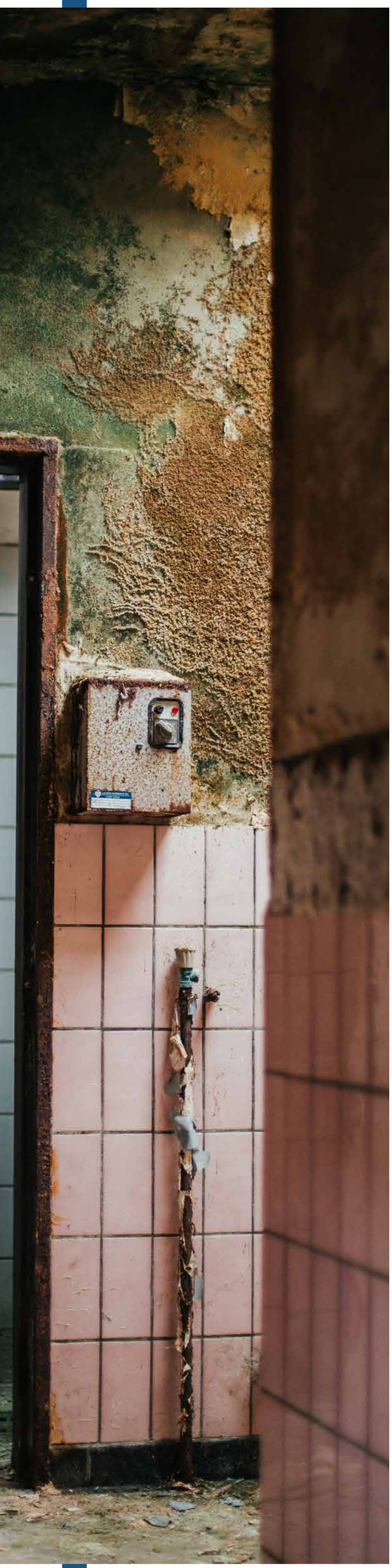
As an example, let's say the temperature is 75 degrees Fahrenheit (24 C), and the dew point is 75. This means the space’s relative humidity will be 100%. In this case, you'll feel like it's 80 degrees (27 C). High RH is problematic because it can make one feel very hot as there isn't the option to cool the body. Another important thing to consider is what happens if the RH is low.

In this case, our sweat will evaporate more quickly, causing us to cool off and to feel cold. As an example, let's say the temperature is 75 degrees Fahrenheit (24 degrees Celsius) and the dew point is -85 degrees Fahrenheit. This means the RH will be 0%. In this case, the air temperature will feel like 69 degrees Fahrenheit (21 C).

So it's Humid.
What's All The Fuss About?

Many don't realize that fluctuations in RH can have a severe impact on a space. More so than changes in temperature. If the humidity is too high or low, the pace will feel unpleasant. But it's more than that. The amount of humidity in a space can directly impact people's health.

If there is too much humidity in a space, there's likely to be mold and mites, affecting breathing, resulting in wheezing, coughing and other allergic reactions. In the U.S. alone, the total annual asthma cost due to mold exposure is estimated to be over **$3 billion**. Too much humidity can also result in heat stroke, fainting and, in some extreme cases, in an uptick in **heart attack rates in the elderly**. Excessive humidity can be life-threatening for babies and the elderly.



Low humidity can be just as challenging to navigate and poses its own set of health risks, including making the occupants more susceptible to colds and other respiratory infections. What's both eye-opening and alarming about humidity is that its impact goes beyond health risks.

Typically buildings with too much humid air trapped in the "building envelope" develop issues with mold and mildew, which impact people's health and the building structure. And this is especially worrying because mold can destroy hardwood floors, walls and other structures.

Humidity that goes unchecked causes corrosion and damages the interior of a building by warping and rotting furniture, rendering it unsafe for use. In extreme cases, humid air can even weaken the walls of a building. Beyond this, what many buildings overlook is that humidity can also negatively impact one's energy bills. This is because occupants in overly humid spaces tend to set their ac lower to maintain climate comfort in the face of humid conditions.

Moisture is Costly Business

Humidity is inconvenient, hazardous and can be extremely expensive for building owners. It seems hard to believe, but a little bit of moisture really does cause a lot of damage. A 2007 study in **ASHRAE journal** found that out of 17,000 construction defect claims, 69% resulted from moisture-related defects.

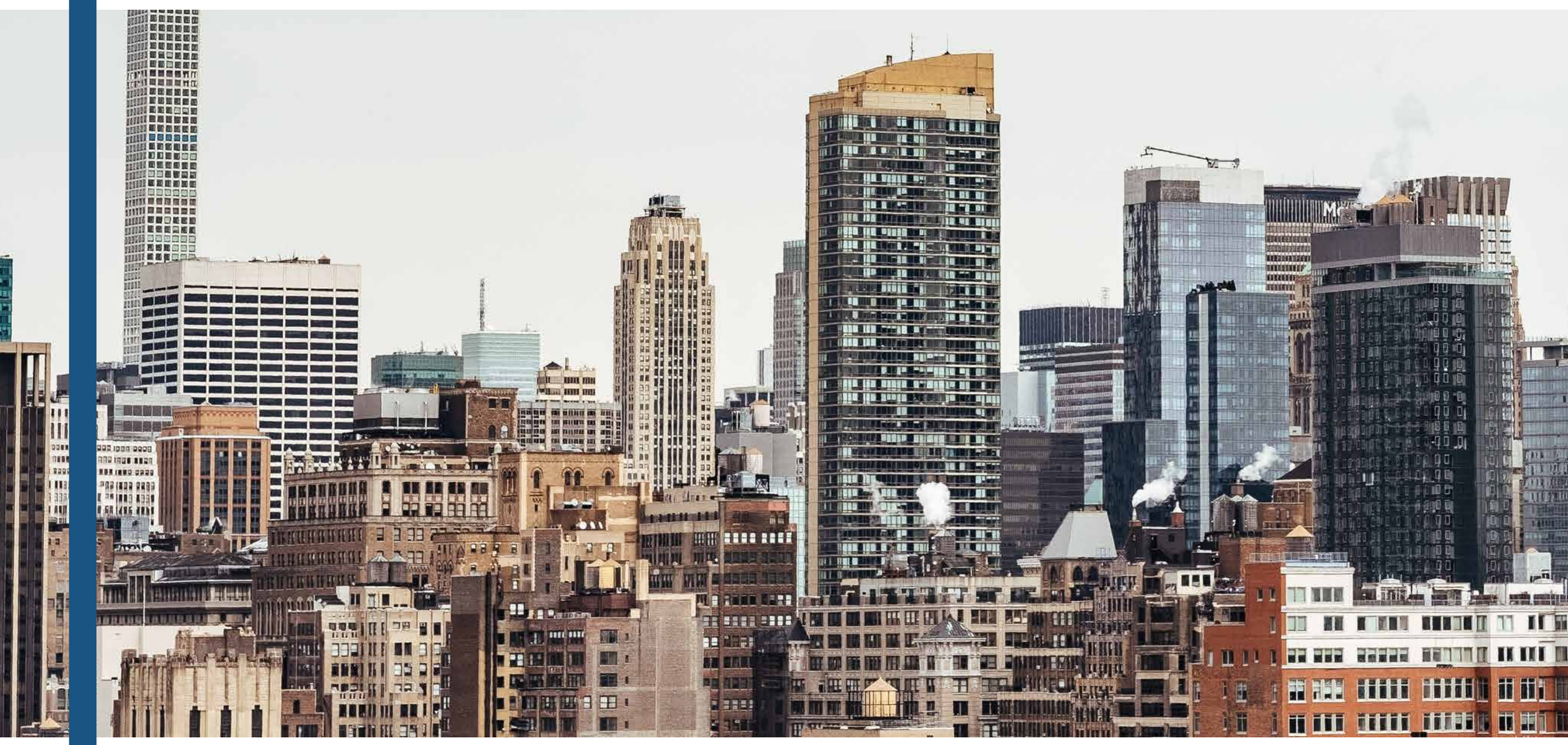
Not only can humidity cause extensive structural damage, but the associated costs add up quickly. And preventing and repairing this damage often falls on the building owner exclusively. This quickly becomes an unwelcoming and costly undertaking that involves everything from increased insurance risk, unexpected maintenance costs as well as expenses associated with things like corroded structural repair. In rare cases, building owners may even have to deal with legal expenses resulting from moisture damage claims.

It's Getting Hot In Here. Now What?

Like it or not, humidity is an issue building owners need to learn to deal with. Which begs the question: Is there a way to circumvent the crippling effects of humidity and still maintain climate comfort? And most importantly, to do so sustainably?

The reality is that HVAC systems are often the go-to solution when dealing with humidity. And in many cases, these cooling systems can effectively reduce both temperature and relative humidity. But this isn't a reliable long term solution, is energy-intensive and can be costly.

Just consider that the **Energy Use Indicator (EUI)** of an air-conditioned office is ten times that of a naturally vented space (for a mild climate). This doesn't bode well for air conditioning as a tool for controlling humidity and makes it clear that we need a more strategic and sustainable approach.



"Too much humidity can cause noticeable damage in as little as 48 hours. And while many building managers are proactive in managing the effects of humidity, most fall short. It all comes down to the approach and the understanding that it takes more than just relying on the HVAC unit to reduce humidity," Iftach Cohen, Airkind CoFounder and CEO

A Case Study: A Thai Hotel Throws Cold Air at the Problem

A while ago, we were approached by a hotel in Thailand that was struggling to manage humidity in vacant rooms. The hotel had a centralized cooling system with chillers and room fan coils but no humidity sensors. Their only way to deal with the humidity was to have employees manually turn on air conditioning units in vacant rooms for 30 minutes every four hours. These 30-minute cycles helped cool the air and did reduce the humidity. But in the long run, this was a waste of energy and was largely a shot in the dark because they had no idea how humid these rooms really were.

Enter Airkind. We helped the hotel define a humid threshold they felt their guests would be comfortable with. Once we installed our humidity detection sensors in rooms, we measured the level of humidity in every room. As soon as the humidity in a vacant room exceeded the pre-configured threshold, our system automatically turned the air conditioning on. In this way, the hotel dramatically reduced its staff's manual workload while also lowering humidity and overall energy load.

office@airkind.ai

414.867.2665

www.airkind.ai

It's Time For a New Approach: Dehumidification at its Best

It's time to rethink how we deal with humidity. And while there are various approaches to dehumidification, most miss the mark and aren't effective. The majority of air conditioning units simply don't have the capabilities to measure humidity because they were built without humidity sensors. So the average building owner would simply measure temperature or occupancy to make predictions about how humid a space is. But this isn't very accurate or reliable.

Traditionally, air conditioning units are manually operated to heat or cool the air to manage humidity. But without proper humidity readings, this often isn't very helpful. This becomes even more problematic when you consider that air conditioning units circulate fresh air to lower levels of CO2, which in the process increases the amount of humidity. Talk about a double-edged sword.

The other issue is the misconception that dehumidification requires the installation of a separate, stand-alone dehumidifier. Our technology challenges this flawed thinking and offers every building owner a promising alternative that focuses on automating air conditioning functionality to control humidity effectively. Because the reality is that with the right technology, there's no reason air conditioning units can't become powerful dehumidifiers.

Our sensors measure the thermal and humidity profile of space. This considers a range of parameters both inside and outside a specific space. We measure ambient temperature, RH, and dew point to understand how humid a particular room is. In this way, we're able to build a reliable humidity profile to automate the ac functionality in the room accordingly. Our sensors not only make automation possible but change how building owners think about their heating and cooling systems.

Final Thoughts: Where to From Here?

Humidity is about so much more than being comfortable. It can affect people's health, a building's foundation and even impact energy consumption. Left unchecked, humidity can wreak havoc. And while this is alarming, it doesn't have to be a death sentence. With the right technology and a proactive approach, it's possible to mitigate the more damaging effects of humidity and pave the way towards true climate comfort.

Looking to learn more about Airkind's Climate Intelligence Platform? **Contact us** - We'd love to hear from you!

office@airkind.ai 414.867.2665 www.airkind.ai